

104

B-2 BOMBER

Y 4. SE 2/1 A: 995-96/15

B-2 Bomber, (H.N.S.C. 104-15), Hear...

MILITARY PROCUREMENT SUBCOMMITTEE
OF THE
COMMITTEE ON NATIONAL SECURITY
HOUSE OF REPRESENTATIVES
ONE HUNDRED FOURTH CONGRESS

SECOND SESSION

HEARING HELD
SEPTEMBER 12, 1996



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B-2 BOMBER

HOUSE OF REPRESENTATIVES,
COMMITTEE ON NATIONAL SECURITY,
MILITARY PROCUREMENT SUBCOMMITTEE,
Washington, DC, Thursday, September 12, 1996.

The subcommittee met, pursuant to notice, at 2:08 p.m., in room 2118, Rayburn House Office Building, Hon. Duncan Hunter (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. DUNCAN HUNTER, A REPRESENTATIVE FROM CALIFORNIA, CHAIRMAN, MILITARY PROCUREMENT SUBCOMMITTEE

Mr. HUNTER. The subcommittee will come order. As most of my colleagues are aware, in May of last year, a month after we had our subcommittee hearing on bombers, the Pentagon publicized its congressionally directed heavy bomber force study.

This study concluded that 20 B-2's, 95 B-1's, and 66 B-52's were adequate for winning the two major regional contingencies postulated by the national military strategy.

Despite the Department's findings, the House, on two separate occasions, rejected, with bipartisan majorities, amendments to both the fiscal year 1996 DOD authorization and appropriations bills intended to prevent production of additional B-2's. More over, the Fiscal Year 1996 Department of Defense [DOD] Authorization Act repealed the previously imposed statutory ceiling of 20 B-2's and added \$493 million in B-2 procurement funds as well.

These funds will be used to convert the last B-2 flight test aircraft into an operational bomber, increasing the fleet to 21 aircraft.

And just a little aside on that, I remember when that happened. That happened right after Bob Dole visited California. President Clinton then announced that we would have this one additional B-2, to which Gov. Pete Wilson, Governor of California said if we could just get Bob to come out here 19 more times we'll have the 20. I know Norm has been urging that trip on the Dole campaign. Although our just concluded work on the Fiscal Year 1997 DOD Authorization Act did not specifically address continued B-2 production, it is this gentleman's position that the issue will again come to the forefront in the next Congress if Republicans retain control of the House.

Most certainly this will happen if Bob Dole occupies the White House, regardless of who controls the Speaker's chair, and though the President continues to reject continued B-2 production, he nevertheless directed that the Pentagon's ongoing deep attack/weapons mix study include consideration of tradeoffs among heavy bombers, tactical strike aircraft and various missiles.

Thus, the possibility exists that this more recent study, which is to be completed some time next year, and which we will discuss further later in the hearing, could determine that buying additional B-2's would be more cost effective than maintaining other assets in the force. If that should occur, then, political outcomes aside, the issue also remains a live one.

In short, I believe the last chapter on the size of the B-2 force has yet to be written. Consequently, since we have an opportunity to hold a few hearings during the remainder of this session, I want to take advantage of the situation and do a little reviewing of the bidding, if you will, on the B-2 from all perspectives—operational, economic, industrial base.

And to help in this endeavor we have before us a very distinguished panel of witnesses. We have my good colleagues, Representative Norm Dicks of Washington, who has served so effectively on the House Committee on Appropriations Defense Subcommittee, and on the Select Committee on Intelligence.

We have with us Gen. Charles A. "Chuck" Horner, U.S. Air Force, retired, who was basically the air commander of the Joint Forces in Operations Desert Shield and Desert Storm, in which Americans had a chance to, by the millions, to watch on their televisions as we took on the fourth largest army in the world and overwhelmed it.

Thank you for being with us, Chuck.

We have Mr. William Lawler, vice president and deputy general manager, Military Aircraft Systems Division, Northrop Grumman Corp., the prime contractor on this aircraft. And we have with us also Dr. Keith Payne, president of the National Institute for Public Policy. And we appreciate, Dr. Payne, you bringing your expertise to this panel.

We have with us Dr. Glenn C. Buchan, associate program director for force modernization and employment, the RAND Corp., which has assisted us many times in making important decisions.

So I want to ask my colleague, Congressman Dicks, to lead off, since I know he's busy with the defense appropriations conference, and may not be able to stay for the entire hearing. Following Mr. Dicks, I would suggest General Horner, Mr. Lawler, Dr. Payne, and Dr. Buchan proceed in that order.

But before I turn the floor over to the gentleman from Washington, I would like to call upon the ranking Democrat of the subcommittee, my good colleague and friend, Ike Skelton, for any opening remarks he might have. Ike.

[The prepared statement of Mr. Hunter follows:]

**STATEMENT OF HONORABLE DUNCAN HUNTER
CHAIRMAN, MILITARY PROCUREMENT SUBCOMMITTEE
B-2 HEARING
SEPTEMBER 12, 1996**

The Subcommittee will come to order.

As most of my colleagues are aware, in May of last year--a month after we had our Subcommittee hearing on bombers--the Pentagon publicized its Congressionally-directed "Heavy Bomber Force Study." This study concluded that 20 B-2s, 95 B-1s, and 66 B-52s were adequate for winning the two major regional contingencies postulated by the national military strategy.

Despite the Department's findings, the House on two separate occasions rejected, with bipartisan majorities, amendments to both the FY 96 DOD authorization and appropriations bills intended to prevent production of additional B-2s. Moreover, the FY 96 DOD Authorization Act repealed the previously-imposed statutory ceiling of 20 B-2s and added \$493 million in B-2 procurement funds as well. These funds will be used to convert the last B-2 flight test aircraft into an operational bomber, increasing the fleet to 21 aircraft.

Although our just-concluded work on the FY 97 DOD Authorization Act did not specifically address continued B-2 production, it is this gentleman's opinion that the issue will again come to the forefront in the next Congress if Republicans retain control of the House. Most certainly this will happen if Bob Dole occupies the White House, regardless of who controls the Speaker's chair. And, though the President continues to reject continued B-2 production, he nevertheless directed that the Pentagon's ongoing Deep Attack/Weapons Mix Study include consideration of trade-offs

among heavy bombers, tactical strike aircraft, and various missiles. Thus the possibility exists that this more recent study--which is to be completed sometime next year and which we will discuss further later in the hearing--could determine that buying additional B-2s would be more cost-effective than maintaining other assets in the force. If that should occur, then--political outcomes aside--the issue also remains a "live" one.

In short, I believe the last chapter on the size of the B-2 force is yet to be written. Consequently, since we have an opportunity to hold a few hearings during the remainder of this session, I want to take advantage of the situation and "review the bidding" on the B-2 from all perspectives--operational, economic, industrial base. To help in this endeavor, we have before us a distinguished panel of witnesses:

Representative Norman D. Dicks (D-WA)
House Committee on Appropriations, Select Committee on
Intelligence

General Charles A. "Chuck" Horner, USAF, Retired
Private Consultant
Former Joint Forces Air Component Commander
Operations Desert Shield and Desert Storm

Mr. William H. Lawler
Vice President and Deputy General Manager
Military Aircraft Systems Division
Northrop Grumman Corporation

Dr. Keith Payne
President
National Institute for Public Policy

Dr. Glenn C. Buchan (pronounced bu-CAN)
Associate Program Director for Force Modernization and
Employment
The RAND Corporation

I will ask Congressman Dicks to lead off, since I know he is busy with the Defense Appropriations conference and may not be able to stay for the entire hearing. Following Mr. Dicks, I would suggest General Horner, Mr. Lawler, Dr. Payne, and Dr. Buchan proceed in that order. But before I turn the floor over to the gentleman from Washington, I would like to call upon the ranking Democrat of the Subcommittee, Ike Skelton, for any opening remarks he might have.

[After Skelton].....Norm, the floor is yours.

**STATEMENT OF HON. IKE SKELTON, A REPRESENTATIVE
FROM MISSOURI, RANKING MINORITY MEMBER, MILITARY
PROCUREMENT SUBCOMMITTEE**

Mr. SKELTON. Thank you, Mr. Chairman, for convening this hearing. Let me also stress the fact that you have worked so hard and diligently on obtaining facts for the future of our bomber force of America. And I think that you're helping write history in that regard, and I compliment you on that regard, sir.

Let me also recognize and welcome our distinguished panelists. Gentlemen, it's a pleasure to see all five of you again, especially our friend, Norm Dicks, who we look forward to hearing from who is so well versed on this subject.

On December 17, 1993, I stood on the tarmac at Whiteman Air Force Base in Missouri and welcomed delivery of the first B-2 bomber as it completed a transcontinental flight from southern California. It was a special moment, a moment marking the culmination of many years of labor, a moment for personal reflection, an experience of the feeling of great pride.

At the precise moment of the bomber's landing, Whiteman Air Force Base became home to the most advanced and sophisticated aircraft in the world. The U.S. Air Force strengthened its future ability to project force abroad over great distances, and our Nation moved one step closer to securing for U.S. military personnel everywhere the advantage of unmatched technology.

The administration's 1993 Bottom-Up Review reaffirmed the importance of maintaining long-range air capability. With its completion, our military establishment adopted a prudent and essential national security strategy of planning to fight two nearly simultaneous major regional conflicts. The B-2 bomber fleet was officially recognized as the central component for meeting the demands of this strategy. Strategists today continue to note its unique combination of long range, heavy payload and stealth for projecting force abroad.

International developments since 1993 have affirmed the prudence of the two major regional conflict [MRC] strategy. Developments in places such as Iraq, Korea, Haiti, the Balkans, and the South China Sea remind us of the fragility of the world's stability. Thousands of U.S. military personnel are forward deployed. Countless American citizens are abroad. And with increased international interdependence, economic interests overseas are growing in importance and in vulnerability.

America, indeed the entire world community, Mr. Chairman, remains vulnerable to the actions of any one of a number of potential belligerents.

It's essential to maintain our two major regional conflict [MRC] strategy to deter aggression and to protect both our interests and our people. If conflict does, in fact, erupt in the future, and then it escalates, the projected bomber force will be aged and strained.

At present the B-2 is the only heavy bomber development, and the Pentagon has no other plans for modernizing or supplementing the fleet of existing B-1's or B-52's. The B-52's were first introduced over 40 years ago, and the newest B-1 has been in service for a decade.

Without the purchase of additional B-2's our Nation will rely on 60- and 70-year-old aircraft in the year 2030. An effective long-range bomber force is crucial to meet the requirements of our strategy.

The capability of projecting force deep into the heart of hostile territories has been and should continue to be the centerpiece of American air doctrine.

With the number of American bases abroad declining, and belligerent activity around the globe ever present, America must retain the ability to strike afar at a variety of threats. Fitted with precision-guided-munitions, only a B-2 Stealth bomber promises adequate effectiveness for penetrating hostile air space and striking mobile military targets or hardened bunkers. This is the ultimate deterrence, due in large part to lessons learned.

While serving on the Review Board of the Gulf Air War/Power Survey, I recognized that Desert Storm ushered in a new chapter for air power. Benefiting from forward-deployed air strips, the U.S. military utilized a deep strike mission to complement our forces at sea and on the ground.

A new level of performance was reached. In the first 48 hours of Desert Storm, air power crippled Iraqi air defenses, wrecked major command centers, destroyed military communications and prevented Saddam Hussein from broadcasting by radio or television.

Compare this with the allied bombing of Nazi Germany in World War II. Years of bombing failed to prevent Hitler from sending or receiving orders at will, or supplying or moving forces by rail.

In the gulf, accurate bombs placed on target shortened the war dramatically. In the conflict of tomorrow, however, we may desperately need long-range air capability. Forward airstrips and Naval air craft carriers may not be available at the moment.

We are here today to continue the effort for shortening future conflicts, or preventing them all together. Our projected heavy bomber force, when mature, will consist of only 185 aircraft. Only two operational squadrons will consist of Stealth platforms, or 16 aircraft. For sensible operational flexibility, three, four, or five squadrons make sense.

Availability of air bases on foreign soil will not be assured, and, Mr. Chairman, we see that at the present moment in the Middle East. And we can never be sure about where or when conflict may occur.

I urge my colleagues to listen closely to today's testimony. The capability promises to ensure a multitude of options to meet the challenges of tomorrow. It's an asset that will provide benefits for the entire National Security establishment. It deserves considerable attention.

I do thank you.

[The prepared statement of Mr. Skelton follows:]

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(816) 826-2675**Congress of the United States****House of Representatives****Washington, DC 20515-2504**Opening Statement of
Congressman Ike Skelton, Ranking Member
Subcommittee on Military Procurement
Committee on National Security

September 12, 1996

Mr. Chairman, thank you for convening this hearing. Let me also recognize and welcome our distinguished panelists.

Gentlemen, it is a pleasure to see all five of you again. I appreciate your participation.

On December 17, 1993, I stood on the tarmac at Whiteman Air Force Base (AFB), Missouri, and welcomed delivery of the first B-2 bomber as it completed a trans-continental flight from southern California. It was a special moment: a moment marking the culmination of many years of labor, and a moment for personal reflection, experienced with a feeling of great pride. At the precise moment of the bomber's landing,

- Whiteman AFB became home to the most advanced and sophisticated aircraft in the world;
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its completion, our military establishment adopted a prudent and essential national security strategy of planning to fight 2 nearly simultaneous major regional conflicts (MRCs). The B-2 bomber fleet was officially recognized as an essential component for meeting the demands of this strategy. Strategists today continue to note its unique combination of long-range, heavy payload, and "stealth" for projecting force abroad.

International developments since 1993 have affirmed the prudence of the 2 MRC strategy. Developments in places such as Iraq, Korea, Haiti, the Balkans, and the South China Sea remind us of the fragility of world stability. Thousands of U.S. military personnel are forward deployed, countless American citizens are abroad, and -- with increased international interdependence -- economic interests overseas are growing in importance and vulnerability. America, indeed the entire world community, remains vulnerable to the actions of any one of a number of potential belligerents. It is essential to maintain our 2 MRC strategy to deter aggression and to protect both our interests and our people.

If conflict does in fact erupt in the future, and then escalates, the projected bomber force will be aged and strained. At present, the B-2 is the only heavy bomber in production or development and the Pentagon has no other plans for modernizing or supplementing the fleet of existing B-1's and B-52's. B-52's were first introduced over 40 years ago and the newest B-1 has been in service for a decade. Without the purchase of additional B-2's, our nation will rely on 60 and 70 year-old aircraft in the

year 2030.

An effective long-range bomber force is crucial to meet the requirements of our strategy. The capability of projecting force deep into the heart of hostile territories has been -- and should continue to be -- the centerpiece of American air doctrine. With the number of American bases abroad declining and belligerent activity around the globe everpresent, America must retain an ability to strike afar at a variety of threats. Fitted with precision guided munitions, only a B-2 stealth bomber promises adequate effectiveness for penetrating hostile airspace and striking mobile military targets or hardened bunkers. This is the ultimate deterrence.

Due in large part to lessons learned while serving on the review board of the Gulf War Air Power Survey, I recognize that Desert Storm ushered in a new chapter for air power. Benefitting from forward deployed airstrips, the U.S. military utilized the deep strike mission to complement our forces at sea and on the ground. A new level of performance was reached: in the first 48 hours of Desert Storm air power crippled Iraqi air defenses, wrecked major command centers, destroyed military communications, and prevented Saddam Hussein from broadcasting by radio or television. Compare this with the allied bombing of Nazi Germany in World War II. Years of bombing failed to prevent Hitler from sending and receiving orders at will, or supplying and moving forces by rail. In the Gulf, accurate bombs placed on the appropriate targets shortened the war dramatically.

We are here today to continue the effort for shortening

future conflicts, or preventing them altogether. If forward airstrips and naval aircraft carriers are not available, conflicts of tomorrow may require more long range bombing capability -- an asset we may find ourselves in short supply. Our projected heavy bomber force, when mature, will consist of only 185 aircraft. Only two operational squadrons will consist of stealth platforms, or 16 aircraft. For sensible operational flexibility, 3, 4, or 5 squadrons are necessary. Mark my words, availability of air bases on foreign soil will not be assured, and we can never be sure about where or when conflict may occur.

I urge my colleagues to listen closely to today's testimony. This capability promises to ensure a multitude of options to meet the challenges of tomorrow. It is an asset that will provide complementary benefits to the entire national security establishment. It deserves considerable attention.

Thank you.

Mr. HUNTER. I want to thank my colleague from Missouri for such an articulate statement, and since Members are rising above and beyond the call of duty today, because votes are over, what I thought we'd might do, we are privileged to joined by the chairman of the full committee, Mr. Spence. We thank you for coming to this important hearing.

I thought we might make anybody that wants to make a statement here to go ahead and do that. And I thought I would start with the gentleman from Arizona, Mr. Stump.

Mr. STUMP. Thank you, Mr. Chairman. I'll only take a couple of seconds. I just want to join with you in recognizing Norm and our distinguished guests, and welcome you here today, and apologize in advance. We're having a tree dedication ceremony for our colleague, Sonny Montgomery, on the Capitol grounds in a few minutes, and I know at least a couple of us will have to leave early.

Mr. HUNTER. After that we're going to bronze him, right? [Laughter.]

Mr. STUMP. That's all that's left to do, I'll tell you.

Mr. HUNTER. Let me next call on—we have a very distinguished gentleman, Mr. Geren, who is retiring this year, and who really has provided great integrity and expertise to this committee and subcommittee.

And, Pete, we're sure going to miss you. Do you have anything you'd like to add?

Mr. GEREN. I don't have an opening statement. I'd appreciate the opportunity to participate in the hearing, and also offer the same apologizes as did my colleague, Bob Stump. I'm going to have to be at that ceremony as well. It's hard to go 30 minutes without honoring Sonny Montgomery, it seems. And the 30 minutes is about up. [Laughter.]

I would like to just, on behalf of the committee, welcome a visitor I have here today from my home town. Happens to be my dad, Preston Geren, who is here and is going to participate.

Mr. HUNTER. Sir, thank you for being with us.

[Applause.]

Mr. HUNTER. Mr. Geren, we want to let you know that we have probably I think the most bipartisan committee—and Norm might argue with us. Maybe he thinks the Appropriations Committee may be a little more bipartisan.

But the National Security Committee is probably the most bipartisan committee in the House, and we try to follow Scoop Jackson's directive that in areas of national defense the best politics is no politics.

And your son, Pete, has been one of those balancing voices, and one of those bipartisan voices that has allowed us to endure some very, very difficult debates, and some very difficult and critical issues, and yet to keep a bipartisan sense on the committee, to keep a stable judgment that allows us to try to do what's best for the country, not what's best for Democrats or Republicans. And we're sure going to miss Pete.

I don't know what you're going to do with him back there. I know he's having a lot of babies. He's trying to influence redistricting in Texas already. But it's great for you to be here, and we sure appreciate your presence, sir.

Mr. GEREN. I appreciate your kind remarks. Thank you very much.

Mr. HUNTER. Well, certainly, Pete. And Jane Harman has been a stalwart for the B-2 from her area in the Los Angeles area. And I know has many of the folks that work on this aircraft in the Northrop area.

Jane, thank you for going beyond the call of duty today and being with us, and the floor is yours.

STATEMENT OF HON. JANE HARMAN, A REPRESENTATIVE FROM CALIFORNIA

Mrs. HARMAN. Well, I thank you, Mr. Chairman, and I applaud your bipartisan comments just made to Pete Geren and to everyone. The B-2, I believe, will be funded in the future because, in a bipartisan fashion, this Congress will figure out that it ought to be. I mean, it is the best buy for our future air power dollars, and I certainly intend to keep lending my voice to a calm and effective and bipartisan debate about the airplane.

The other point I'd mention is that as you mentioned, it is built in California, although there are subcontractors all around. It is a major project for California, and one in which all Californians can be very proud.

But it does, I think, provide in terms of ease of employment, payload and survivability what we will need in the future war theaters.

A perfect example is what's going on right now in Iraq. Wouldn't it be better if we were using B-2's than B-52's. I thank you and I yield back, and I look forward to the testimony.

Mr. HUNTER. I thank the gentlelady, and I think our panelists will be addressing that very question, because I think that's one a lot of Americans have thought about as they watch these activities the last couple of days.

We have also a great friend, who just joined us, from the Los Angeles, northern Los Angeles, Buck McKeon, who has been one of the most articulate advocates for this system. Buck, anything you'd like to say?

STATEMENT OF HON. HOWARD P. (BUCK) McKEON, A REPRESENTATIVE FROM CALIFORNIA

Mr. McKEON. I usually don't like to speak much. But about the B-2 I'd like to speak. I think it's interesting, as Jane referred to what was going on right now in the B-2's versus the B-52's, I think sending the B-117's over there indicates the need for Stealth.

And they're sending eight F-117's. One B-2 could do that same job. I think it's important to understand the necessity for Stealth. We had a good visit out there in Palmdale a few weeks ago by the Speaker. And he committed at that time that he favored 50 B-2's.

I think when we were in the debate earlier, we talked about how many we should have. I think we figured if we had a wing at each of those three bases, Diego Garcia, Guam, and Whiteman, and then five to cover any down time, that is a good way to arrive at the number.

It was interesting, I think, Bill, you made the comment that you'd had think tanks looking at this project for a number of years,

and Newt, in just a short visit, was able to articulate better why we needed the B-2 and why it was so important, and gave many of the reasons for it. And I'm sure that will come out in the hearing here today.

And I'm looking forward to your testimony and the things you have to say. I know it's very important in my district, but I think it's also very important for the country, and what we're talking about is not for the next 5 or 10 years or 2 years till the next election. We're talking about 40, 50 years down the line, when probably we won't be using B-52's anymore.

I think even the most ardent supporter of B-52's realizes that they probably won't be able to fly them for a hundred years. But thank you, Mr. Chairman, for this hearing.

Mr. HUNTER. Mr. Lewis. Any comments?

[No response.]

Mr. HUNTER. Mr. Thornberry. Texas is well represented, as always.

All right, it looks like Mr. Evans was here. When he returns, if he wants to make a statement, we will allow him to do that.

Gentlemen, once again, thank you for being with us. This is a very critical issue, and we'll lead off with Mr. Dicks. Norm, the floor is yours.

STATEMENT OF HON. NORMAN D. DICKS, A REPRESENTATIVE FROM WASHINGTON

Mr. DICKS. Mr. Chairman, I want to thank you, first of all, and all the members of this committee, for the tremendous support you've given to the B-2 over the years.

I can remember in the spring of 1980, when, as a member of the Defense Appropriations Subcommittee Harold Brown came to our committee and said we're going to build a long-range Stealth bomber.

And we didn't completely understand at the time all of the implications of it. There was a lot of discussion in those days about B-1B's. And I just want to tell you, here we are in 1996, think of it, it's 16 years later and we're still talking about this important weapons system.

I want to insert my statement in the record. I'm going to refer to parts of it.

But again, I want to thank this committee for its bipartisan support of the B-2. We had the funding for the A/B-1, and of course, this year, a package of weapons that we have to put on these bombers.

If there's one thing I'll say today, besides my tremendous desire to make certain we get an adequate bomber force, is that we've got to weaponize these bombers. This is one of the great deficiencies.

Glenn Buchan, in one of his countless reports on long-range bombers, pointed out just a couple of years ago, no matter what we do, ladies and gentlemen, we've got to get the smart conventional weapons on the B-1's. And we use our B-52's with the long-range cruise missiles. And then we've got to get the weapons on the B-2's.

We just put GPS Aided Targeting System/GPS aided munition [GATS/GAM] on, it was an initiative that this committee sup-

ported. They will be starting to do the testing on those weapons and be able to start dropping them in the near term.

Mr. HUNTER. Norm, you may recall, we had three major themes this year in our procurement markup at the direction of Chairman Spence. One was aircraft safety, with the crashes we had. Another was basic ammunition loads for our ground forces.

But one of the three prime objectives was arm the bombers. Get precision guided munition [PGM's] on these bombers, on B-2, and the other bombers, and try to move the programs forward wherever we're able to.

I hope the appropriations process and conference that is taking place right now is leaving at least a good portion of that authorization effort, because we put in a large amount of money to arm the bombers.

It didn't make sense to have the platforms without the value that PGM's bring us.

Mr. DICKS. You know, when you sit today and look at the situation that we face in the gulf, and remember Saddam Hussein's invasion of Kuwait, and the fact that we had very little capability to stop him at that time, and then you see the provocation with Saddam saying that he is no longer going to honor the no fly zone, and that if we put our F-117's in Kuwait that he is going to consider that as an act of war.

And the fact that we probably couldn't base the F-117's today in Saudi Arabia, Jordan, or Turkey. The whole idea of what we've been talking about, the need for long-range power projection capability, as suggested by Congressman McKeon, of having the right number. I'd say 15 to 20 at Diego Garcia, Guam, and at Whiteman Air Force Base.

So literally you could take on any contingency that occurred anywhere in the world with a long-range stealthy bomber that can operate autonomously.

And I think one of the major facts that I want to reiterate here is that so many people still think of the B-2 as a nuclear bomb dropper. This is something that was part of the cold war. We're going to use it to go to the heart of the Soviet Union. That is not what we're talking about. What we're talking about is a revolutionary conventional weapon. A weapon on which we can take 16 joint direct attack munitions [JDAM's], for example, 2,000 pound bomb, guided kit, can do what the F-15's, the F-117's did in the gulf war. Sixteen individually targeted weapons on 16 targets.

Now, think about that. Know what that weapon costs? \$13,000 per weapon. Sixteen times 13 is \$208,000. The cost of one standoff cruise missile is \$1.2 million, or \$19.2 million for 16 on a B-52. Now that is an extraordinary difference—\$19.2 million versus \$208,000 for 16 JDAM's. And that gives you the ability to penetrate with a stealthy aircraft, long range. You can go one third of the way around the world.

Now, in a scenario that Glenn Buchan ran for me in 1991, RAND (Corp.) looked at Saddam's division moving from Iraq into Kuwait, and it postulated that if we had three B-2's with the sensor-fused weapon. Now, a sensor-fused weapon is a bomblet. Each B-2 would have like 1,440 of these individual bomblets.

So you come in with these three aircraft as Saddam's division is moving south, you drop these sensor-fused weapons on them. And the outcome of this was that we knocked out 46 percent of the mechanized vehicles in that division.

Now, these weapons are just coming into the inventory, but with that sensor-fused weapon you literally destroyed the division before it got into Kuwait.

Now, think about that. To me that is a revolutionary weapon. I asked RAND at the time, is there any other combination of conventional weapons that can do that? Can stop an advancing armored division, 750 vehicles, by the way. And they said no.

So if we're thinking about a weapon for the future, a weapon that I think would give us the potential of a conventional deterrent, if we had adequate numbers—as I said somewhere between 15 to 20, at the three sites we mentioned—I think Saddam's going to think twice about whether he comes across that border at all if he knows his prized Republican Guard is going to be obliterated in the field.

Now, that's not to say that the B-2 can operate by itself. You're going to have to have all these other systems, and we have to have an Army, we have to have a Navy. But this gives us a potential to do things in the early going, in the first couple weeks of a war, before maybe you can move the carriers into place, before you can get all the equipment and move the tac air out into the gulf.

You've got a capability within a matter of hours of flying a B-2 from Whiteman or Diego Garcia right in and attacking Saddam's prized Republican Guard if it should come across and go into Kuwait again.

Now, we don't have the weapons on the B-2 yet to do that, and we're still getting them added, and we're working through this. This is why it's so important for this committee to give us the resources.

But when you think about it, you take Stealth, long range, and these payloads. Let me tell you about another capability. If you have—and I'll pick out the weapon here, it's B-U—whatever it is. The BU-133-GAM.

This will give you a capability to go against bunkered-in heavy targets. You can fly right in with the B-2, drop this on these targets that literally are invulnerable today without it.

Also, using joint stand off weapons [JSOW] and the wind correct munition dispenser, you can go after mobile targets. One of the major problems in the gulf war was going after the Scud launchers, or going after mobile surface-to-air missiles.

When the B-2 gets the block 30 upgrade, and Joint Tactical Information Distribution System [JTIDS], which is this satellite link that will give us intelligence in real time in the cockpit, they will be able to locate and attack these mobile Scud launchers. That was a major deficiency in the gulf war.

So with one platform, you can go in with JDAM's and hit 16 targets, you know, air fields, surface-to-air missiles, all these other things. You can go against armor with sensor-fused weapons or gator mine, other things, other submunitions, and you can also go after hidden bunkered systems, and you also can go after relocatable or mobile targets.

Now, believe me, that is some capability. And you sit back and think about this. I am a big supporter of aircraft carriers—always have been. I think there is a role for the Navy in the future. But when you look at the Navy today, they don't have a long-range stealthy airplane coming off those carriers.

That's why I'm such a big supporter of the Joint Strike Fighter, which will give the Navy for the first time a long-range stealthy attack aircraft, so that it can operate autonomously, like the B-2 will be able to when we get the weapons on it, and as the F-117 can do today.

So I think we're really talking about a revolutionary technology. We're talking about a capability that can be utilized, and also we're talking about a conventional deterrent. And the major thing, again, is that the weapons we're going to use on this system are much less expensive than the weapons you have to do if you stand off.

Now, let's talk about this. The administration's policy says let's use stand off weapons. Stand off weapons are limited. First of all, they can only go to a fixed target. If that target moves or goes somewhere else, it can't move—once that thing is targeted on it, it can't go after the mobile target. It has to go right to the point on the earth where it was targeted to in the first instance.

It costs a lot of money—\$1.2 million for a long-range cruise missile, versus \$1,300 for a JDAM's. And you have less capability, because the warhead on the long-range cruise missile is much smaller than the 2,000 pound bomb you're dropping off the B-2.

So that's one major difference. And it doesn't have any capability against advancing armor unless you go in and take the risk of putting our kids at risk by using a stealthy airplane and going in and penetrating.

Now, you could use all the other support aircraft, the jammers, the suppressors and these things, and then you can use your non-stealthy planes. But in the early going, until you have air superiority, or you can deal with the surface-to-air missiles, you're going to get a lot of those kids shot down.

And so in my mind, in the early going—I think General Horner can certainly talk more about this—as I recall, in the first 2 weeks of the gulf war with the F-117, 2 percent of the assets knocked out 40 percent of the critical targets. Stealth was crucially important in the early going.

And so I'm going to summarize today, and you all know how I feel about this. I'm going to summarize by just saying a couple of things that came out—the independent staff of the Commission on Roles and Missions, they summarized their report to the Commission. And they said the following things about the B-2.

Mr. HUNTER. Was this the report that was rejected by the Commission but was recommended by the staff?

Mr. DICKS. Yes. Was recommended by the staff. I think it's the best report—Glenn's right close, but I like this report. OK? It said all the right things. And what it said was we need another 20 B-2's. And then it gave a list of reasons, the things that the B-2 could do. Starts off with the potential to halt—as I've said—to halt an armored invasion in a matter of days from long range.

The ability to operate unencumbered outside the reach of weapons of mass destruction; the ability to achieve strategic or oper-

ational surprise quickly, imposing widespread attack and paralysis on an aggressor, with minimum exposure of friendly personnel; the psychological impact of strike without notice; the ability to induce enough uncertainty in a potential aggressor to deter hostile activity whether the U.S. military is engaged elsewhere or not; and independence from forward basing and pre-positioning assets.

The staff report states that Stealth dramatically reduces, and depending on the threat, can eliminate the need for large numbers of expensive and highly specialized suppression and force protection aircraft.

This leverage of Stealth results not only in freeing non-Stealth assets to strike other targets, but enables concepts of operation previously unachievable. A capability for simultaneous attack on the entire array of high value targets with little or no need to suppress enemy air defenses.

This enables tactical surprise, a larger span of influence, fewer casualties, paralyzing effects, and shorter time to impose effective control over the enemy. The fact is every credible study done on the value of heavy bombers has arrived at the same conclusion: that a long range, stealthy bomber is not only relevant, but critical in today's environment.

And I will say this, in my 20 years of service in this Congress, 18 years on the Defense Appropriations Subcommittee, there has not been a more critical issue than this. I mean, I really believe that the security of this country will be enhanced dramatically if we have the right sized bomber force.

And then we can worry a little bit less about the problems with the B-52 and the B-1, though we can do some good things to help, especially the B-1B's, to be more effectively utilized.

But I believe that when you look at all the comparisons, there is no weapons system that brings to bear the potential capabilities of the B-2 in terms of conventional war fighting and deterrence.

And that's why I hope and pray that we can, on a bipartisan basis, in the next Congress keep the low rate of production going. Keep that industrial base in place out there in California, keep building these B-2's. And I think we will have done a great service to this country if we're able to achieve that on a bipartisan basis.

And even if we have to do it right here in the Congress, and I hope and pray that the study that's being done over there, that our group is monitoring very closely, will recognize and make the hard decisions.

That's why we voted for Goldwater-Nichols, was to give the Chairman of the Joint Chiefs an ability to sort out and make hard calls. And unfortunately, both in this administration and in previous administrations, there's a feeling over in the building, this is just too hard.

Well, as we have less money for defense, that is no longer an adequate answer. We've got to be able to make the hard, tough decisions.

And this requires, I think, defense statesmanship, and I think we in this Congress have to be cognizant of the fact that we're going to have to give up some things. We can't have all our pet stuff that doesn't work, and we're going to have to make some hard choices here as well.

So I'm sorry I took so much time, but as you all know I feel very strongly about this, and I'm delighted to be here with my colleagues and I look forward to their presentations.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Dicks follows:]

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**REMARKS OF
U.S. REP. NORM DICKS
HOUSE NATIONAL SECURITY COMMITTEE
SEPTEMBER 12, 1996**

Mr. Chairman, I very much appreciate the opportunity to address the Committee today on the future of our bomber force -- an issue I believe to be the most critical procurement item facing the Congress and the Department of Defense at this time.

I'd like to begin Mr. Chairman, by commending all the hard work done by your subcommittee and the full Committee on National Security on the B-2. Had it not been for the solid, bi-partisan effort to include funding for this program in your mark both last year for the AV-1 and this year for the critical B-2 upgrade program, we would not be in the

position today of discussing additional B-2's in the future.

As a preface, I would also like to take note of the irony presented by our current policy in Iraq. Today's CNN headlines clearly highlight the questions we have been posing for many years.

This week President Clinton is considering options for retaliation against Saddam Hussein, who has fired missiles at our F-16's and flaunted the "no-fly zone" boundary that we have tried to impose on him. With mobile radars and surface-to-air missiles threatening U.S. planes patrolling the no-fly zone, sending non-stealthy F-16's is dangerous, and launching stand-off weapons from more remote distances offers less accuracy -- not to mention

higher cost.

What options does the president have? Not many. This is a mission that clearly calls for stealth, and presumably for the F-117s that performed so well in the Gulf War. Unfortunately, our options for forward basing this time around is severely limited because of the fragmentation of support by the former Gulf coalition for our current objectives in the region. We are forced therefore to base from area that was a third or fourth option. The carriers are an option, but today, there are no planes in our entire inventory that are stealthy that can be launched off a carrier. That Mr. Chairman, is why I am such an outspoken advocate of the Joint Strike fighter. This aircraft will provide the Navy -- finally -- with a long-range

stealthy attack aircraft which will greatly enhance the effectiveness of our carrier battle groups.

I know this is deja vu for many people in this room, because this is the type of scenario we have cited in many of our debates over the past years and because the current Iraqi situation is precisely the type of threat we will be facing in the coming decades. There is a clear requirement for a conventional weapon that can be sent long-range without escorts and with limited detection by enemy radars, and then return home safely following the mission.

Watching this dilemma play out on CNN this week, I think you can all imagine my tremendous frustration that

we are still having this discussion at all -- that we are still stuck on the decision over whether to go forward with building an adequate number of these aircraft to give us a credible deep-strike capability.

The Congress has clearly spoken on this issue -- voting twice over the past year-and-a-half to continue with low rate production for the B-2. Seven former Secretaries of Defense have written to the President of the United States expressing their strong support for continued low-rate production of the B-2, and, every single credible study that has been done on this matter -- including the 1991 RAND study, the bomber study done by retired General Jasper Welch, and the 1995 "staff" study of the Roles and Missions Commission, have

expressed overwhelming support for continued production of this aircraft.

Yet still, because many of the so-called “experts” in the defense arena have a fundamental misunderstanding about the conventional capability and strategic value of the B-2, we are still pondering its future. But I am confident that we will move forward. The argument for this aircraft is so compelling, so obviously correct if you look at the program on the merits, that I simply don’t believe that reason and logic can be denied.

In addition to misunderstanding the conventional role of the B-2 bomber, another problem that proponents of the B-2 face is the simple fact that, as dollars get tighter, the temptation to

abandon efforts at maintaining our technological edge becomes greater. The decision to put off buying what is needed in exchange for what appears -- at least in the short-term -- to be cheap becomes quite compelling for some. Unfortunately, when it comes to matters of national security, short-sighted decision making only ends up costing us more money in the long-run when we discover we are without the capability we need to achieve our military and political objectives.

There is simply no other single weapon system in our military inventory that brings the magnitude of strength and flexibility as the B-2. With its stealth, its large -- and diverse -- payload capacity, its long range capability, and its on-board battle management features, the

B-2 promises to play an especially vital role in future U.S. military operations. The bloc 30 upgrade of this aircraft will allow U.S. leadership the ability to strike with precision and virtual impunity against heavily-defended, high-value targets deep in enemy territory, as well as time-urgent targets that may be the key to the momentum of battle.

One of the keys to the B-2's enormous flexibility is its ability to employ such a wide variety of weapons -most importantly the revolutionary Precision Guided Munitions (PGMs) and submunitions that are coming on line. The sheer variety of targets that can be engaged by the B-2 by utilizing these PGM's is revolutionary. Utilizing 16 individually targeted 2000 pound JDAM munitions one B-2 could perform the job

of an entire formation of fighters -- executing tasks ranging from debilitating runways, disabling fuel facilities, knocking out command and control bunkers, attacking power grids, etc. Utilizing JSOW or Wind Corrected Munition Dispensers armed with the Combined Effects Munition (CBU-87) or SFW, the B-2 could provide targeting of SA-10/SA-8 mobile Surface-to-air-missile launchers; With BLU-113/GAM the B-2 will be equipped to penetrate hardened, underground targets that are currently invulnerable to all our conventional weapons ; Using Wind Corrected Munitions Dispenser and Combined Effects Munition or Sensor Fuzed Weapon, the B-2 will be able to attack moving armored forces.

Scenarios developed by the RAND

corporation underline the revolutionary and deadly combination of precision and stealth. In a 1991 study done by RAND, a simulation was conducted utilizing three B-2s against one of Saddam's advancing armored divisions, consisting of approximately 750 combat vehicles. Those three B-2's, armed with Sensor Fuzed Weapons, managed to destroy 46 percent of those combat vehicles -- not only halting the armored divisions advance, but inflicting so much damage that the division could not be reconstituted.

I believe that if the B-2 could have been deployed to the Persian Gulf as Saddam Hussein was threatening to invade Kuwait, the Iraqi dictator would have been much more hesitant to cross the border, giving us the potential

capability of a CONVENTIONAL DETERRENT.

The RAND scenario demonstrates that the B-2 can play a critical role in stopping a conflict before it even starts. Think for a moment about the revolutionary implications of possessing a conventional deterrent. If, as the RAND study implies, the B-2 could have prevented Saddam from crossing the border in the first place, it would have saved \$70 billion in US and allied treasure required to fight the war -- not to mention the precious loss of life. We must start considering cost-avoidance, not just the flat procurement cost, when discussing the affordability of the B-2.

In addition to the RAND study, there is the analysis performed by the staff of the Congressionally-directed Roles and

Missions Commission which I alluded to earlier. In my judgement, this may be the best study ever done on the value of long-range bombers. The unequivocal recommendation of the Commission staff is to go forward with an additional 20 B-2s. Specifically, the staff concluded the B-2 would provide the following:

- The potential to halt an armored invasion in a matter of days from long range;**
- The ability to operate unencumbered outside the reach of Weapons of Mass Destruction;**
- The ability to achieve strategic or operational surprise quickly, imposing wide-spread attack and paralysis on an aggressor with minimum exposure of**

friendly personnel;

- **The psychological impact of strike without notice;**

- **The ability to induce enough uncertainty in a potential aggressor to deter hostile activity -- whether the US military is engaged elsewhere or not;**

- **Independence from forward basing and pre-position assets.**

The staff report states that "...stealth dramatically reduces, and, depending on the threat, can eliminate the need for large numbers of expensive and highly specialized suppression and force protection aircraft....this leverage of stealth results not only in freeing non-stealth assets to strike other targets but

enables concepts of operation previously unachievable -- a capacity for simultaneous attack on the entire array of high value targets with little or no need to suppress enemy air defenses. This enables tactical surprise, a larger span of influence, fewer casualties, paralyzing effects, and shorter time to impose effective control over the enemy".

The fact is, every credible study done on the value of heavy bombers has arrived at the same conclusion -- that a long-range, stealthy bomber is not only relevant, but critical in today's threat environment.

Again, the current situation in Iraq underlines this notion. In our initial foray into the region last week, B-52's -- which

are over 40 years old -- were deployed into Southern Iraq in order to knock out command and control facilities in response to Saddam's attacks on Kurdish rebels. While the B-52's performed well, the way in which the mission had to be conducted demonstrates the downside of having to use a non-stealthy aircraft.

Because the B-52's cannot penetrate deep into enemy territory, stand-off weapons had to be employed in order to hit target sites. This is fine so far as it goes and clearly, some stand-off capability is needed to engage certain targets at the beginning of any contingency.

However if the President were able to deploy the B-2 against those same

command and control targets using B-2's with PGMs, the rate of accuracy would increase substantially and the cost would be much less because the cost of expended weapons would be greatly reduced. Consider the fact that you could employ a full load of sixteen JDAMs at a cost of 13,000 per weapon (208,000 for a full load of sixteen) on the B-2 while the average cost of a single cruise missile is over \$1.2 million -- or \$19.2 million for sixteen cruise missiles.

Obviously, events in Iraq remain fluid and the outcome is still unclear. What is clear from the current situation however, is the strategic value and flexibility that a long-range, stealthy bomber would provide to our war-fighting commanders.

I am hopeful that the Deep Attack Weapons Mix Study (DAWMS) which has been tasked by the President of the United States will arrive at that conclusion as well. I have great respect for the individuals working on the DAWMS study and I believe that if the analysis is done objectively and on the merits, it will correct the flawed results of last year's Heavy Bomber Study and will demonstrate the clear need for including additional B-2's in our future bomber fleet.

The study will give us a fresh perspective, and particularly in light of the "reminder" sent to us by Saddam Hussein this month, it should help us re-orient U.S. defense planning for the future. That is one of the crucial tasks of this committee, Mr. Chairman, and I

**am pleased to be able to share my
perspective on this important question of
U.S. national security policy.**

Thank you.

Mr. HUNTER. Thank you, Mr. Dicks. And we have a copy of the study that you've referred to, and without objection we will put that in the record.

[The information referred to was submitted for the record:]

DUNCAN HUNTER
520 DISTRICT CALIFORNIA

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June 8, 1995

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Dear Colleague:

Attached is the bomber study that never saw the light of day The Roles and Mission staff analysis supporting the B-2, which was summarily rejected by the Commission.

Fortunately the analysis remains intact pointing out that two B-2 aircraft costing \$2.2 billion can destroy the same number of targets as a flotilla of 75 conventional aircraft. This report makes the case for *precision* and *stealth* unique to the B-2.

Please read it before the vote next week and then join me in voting for continued American air superiority with the B-2 bomber.

Sincerely,

Duncan Hunter
Member of Congress

DH/vm

Commission on Roles And Missions Evaluates B-2

Under Congressional direction, the Commission on Roles and Missions (CORM) was established to analyze the general direction and responsibilities of the four fighting Services in the post-Cold War era. The CORM was established following Congressional dissatisfaction with previous attempts by the Department of Defense to reorient and reorganize.

As part of this broad effort, Congress asked the CORM to provide an independent and considered opinion on the proper size of the B-2 bomber inventory and conduct tradeoff analysis between B-2s and other power projection forces. According to published reports, the CORM staff provided their analysis to the Commissioners in early May. The examination was conducted by the CORM staff, who were supported by the Institute for Defense Analysis. The latter agency also conducted OSD's recent Heavy Bomber study which recommended against procuring additional B-2s.

The CORM illustrated that additional B-2s would be more cost-effective than a wide range of other power projection forces and that they also offer a range of unique capabilities.

The reasons for the different conclusions lie in the broader scope of the CORM analysis. The OSD study employed computer simulations to examine only tradeoffs *within* the bomber force. The CORM analysis looked at the impact of stealth on the Gulf War and employed quantitative analysis to trade off bombers, fighters, aircraft carriers, and ships. The CORM report was not flattering to the OSD effort and noted: "The OSD bomber study illustrates the fundamental difficulty the Department has in making force structure decisions--it generally limits alternatives to stovepipes restricted to similar platforms or within service budgets rather than evaluating joint capability to achieve a particular effect..."

Not only did the CORM analysis illustrate that additional B-2s would be more cost-effective than a range of other weapon systems currently in procurement, it concluded that stealthy B-2s armed with precision weapons have the potential to provide key capabilities not available from other forces. The CORM concluded that additional B-2s provide:

- The potential to halt an armored invasion in a matter of days from long-range;
- The ability to operate unencumbered outside the reach of enemy weapons of mass destruction;
- Independence from forward basing or carrier prepositioning;
- The ability to achieve strategic or operational surprise quickly, imposing widespread attack and paralysis on an aggressor with minimum exposure of friendly personnel;
- The ability to swing rapidly from one MRC to another;
- The psychological impact of strike without notice;
- The ability to induce enough uncertainty in a potential aggressor to deter hostile activity conventionally whether the U.S. is militarily engaged elsewhere or not;
- Reduced support assets, personnel, and basing requirements to achieve equivalent effects with non-stealth and/or smaller payload, shorter range aircraft. "

To summarize, the independent staff of the Commission on Roles conducted a broad force-wide analysis and concluded that additional B-2s are not only more cost-effective than other forces, but indeed, offered the potential to revolutionize U.S. power projection capabilities.

DRAFT

Future Bomber Force

1. **ISSUE:** Should the U.S. terminate bomber production or continue building long-range, stealth bombers?

2. **ISSUE DESCRIPTION:** Under the current DOD budget program the United States will stop building bombers in 1998. The B-2 has been the subject of controversy since the original aircraft roll-out. The driver of that controversy has been the aircraft's high individual unit cost, which rose steadily as the total buy was reduced from 132 to 75 to 20. Stopping the B-2 program at twenty aircraft was a decision primarily based on short term budget constraints, not strategic, operational or life-cycle cost considerations. The current status of B-2 production—nearing completion of the final funded aircraft—and the requirement for additional funding in the FY 96 budget to maintain B-2 production capability, suggests that urgency for informed judgment on these issues is high.

The Senate Armed Services Committee, in its report on the FY 95 Defense Authorization Bill, found the DOD bomber force posture and funding proposals "unacceptable." As a result, Congressional direction to the Commission includes: "...the conferees direct the Commission to specifically address this issue [the proper B-2 stealth bomber inventory] in its report, not only in the context of the preservation of the industrial base, but for the critical capability the B-2 provides to our national security." (HCR 103-747); "...consider tradeoffs between more stealthy aircraft and fewer support assets (in particular, the kinds of tradeoffs presented by the Air Force during testimony on the Department of Defense Authorization Act for Fiscal Years 1992 and 1993)." (SH 102-255); "...review thoroughly the capabilities of bombers and carrier-based air forces in the early phases of a short-warning MRC." (SR 2182); "The independent Roles and Missions Commission is examining bomber force structure tradeoffs with other military forces." (SR 2182)

3. **ISSUE PAPER PURPOSE:** The paper synthesizes analytic support from the Institute for Defense Analyses (IDA), Center for Naval Analysis (CNA), RAND Corp, Synergy Corp and research conducted by the Commission staff. The paper presents a *spectrum of options* for consideration by the Commission. The paper focuses on Congressional direction, the leverage and utility of long-range stealth, and potential force trade-offs.

4. OPTIONS:

OPTION 1—Endorse termination of U.S. bomber production (current program)

OPTION 2—Recommend continued production of the B-2 without comment on size or offsets

OPTION 3—Recommend additional B-2 production at a low rate (1.5 or 3 B-2s per year)

OPTION 4—Recommend a specific B-2 force size objective

DRAFT

5. OPTION EVALUATION:

The Commission on Roles and Missions (CORM) staff evaluation consisted of: 1) a review of recent bomber/force structure studies and analyses to include the recently completed Office of the Secretary of Defense (OSD) heavy bomber study conducted by IDA; 2) an analysis of the impact of stealth from the Gulf War; 3) an analysis of a spectrum of potential deep attack force structure capabilities and bomber trade-off options; and 4) a review of industrial base considerations.

B-2/Bomber/Force Structure Study/Analysis Review:

A list of the 24 studies that were reviewed (13 specifically addressing bomber force structure) are at appendix 1. The studies generally conclude that bombers, and the B-2 in particular, are cost-effective, and in some cases the only means, of rapidly projecting survivable power. Most of the bomber studies reviewed contend that more than 20 B-2s would facilitate a two MRC strategy, and several recommend more B-2s. The recent OSD heavy bomber study did not recommend adding to the B-2 inventory.

The outcome of a particular study and associated recommendations are highly dependent on its assumptions. Studies that presume little or no warning favor adding B-2s to hedge against surprise and provide an increase in warfighting options (such as the potential to stop armor invasions without deploying large surface forces). A study like the OSD bomber study that presumes significant warning and assumes the U.S. acts on that warning to deploy large numbers of aircraft will conclude that while increasing the number of B-2s provides additional capability, that added capability is "modest" relative to all the forces in-place. Given *only* the options of adjusting the B-1 and/or the B-2 force, and assuming that advanced precision weapons are not otherwise procured, and carefully selecting a definition of "effectiveness," the OSD bomber study concludes that procuring additional advanced munitions is more cost-effective than buying 20 more B-2s.¹ Selecting a different measure of "effectiveness," or assuming the Department plans to adequately fund PGM stocks for the currently planned aviation force, or considering other aviation alternative options, would change the OSD study conclusion.

The construct of the OSD bomber study illustrates the fundamental difficulty the Department has in making force structure decisions—it generally limits alternatives to 'stovepipes' restricted to similar platforms or within Service budgets rather than evaluating joint capability to achieve a particular effect across the spectrum of possible contributors regardless of what Service a platform comes from or what kind of system it is.

The studies raise additional factors affecting bomber quantity, mix, and funding issues. Those include: the uncertainty of where, when, and how future conflicts will occur (and the role of bombers in these conflicts); the performance of conventionally upgraded bombers in conventional combat operations; the requirements for precision weapon delivery upgrades and funding of adequate stocks of precision munitions; the near term focus of the Department's budget that gives more weight to procurement costs and less to specific system life-cycle costs; the reluctance of the Department to consider offsets among weapons systems other than

¹USD (A&T), Heavy Bomber Force Study Brief, 3 May 1995.

DRAFT

bombers or from a joint perspective across Service boundaries; and the perceived threat that the combination of stealth, payload, and range pose to the Services' traditional force structure sizing approaches. Hence current bomber issues have several imponderables.

Gulf War Analysis of the Stealth Multiplier Effect:

Not until 1991 was stealth employed in large-scale combat operations. An analysis of the attack plans from the Gulf War reveals very high leverage from the combination of stealth and precision. This leverage is not widely understood. Employment of non-stealth aircraft requires large numbers of support aircraft to suppress enemy air defenses which limit the total number of targets that can be attacked at any one time. Stealth dramatically reduces and, depending on the threat, can eliminate the need for large numbers of expensive and highly specialized suppression and force protection aircraft. A comparison of a non-stealth attack during the Gulf War with a stealth attack at about the same time illustrates. The non-stealth joint force package consisted of 38 fighter/attack aircraft from the USAF, USN, USMC, and Royal Saudi Air Force: 4 A-6s, 4 Tornados (the 8 bomb droppers), SEA-6B electronic jammers, 17 F/A-18s and 4F-4Gs to suppress surface to air missiles, and 4 F/A-18s to protect against air threats. A total of 38 aircraft were required so 8 could drop bombs on 3 aimpoints. At the same time twenty (20) stealth F-117s attacked 37 aimpoints in other areas with an equal or higher air defense threat—an over 1200 percent increase in target coverage using 47 percent fewer aircraft.

Targets may contain one or more aimpoints. The number of aimpoints per target will vary depending on the type of aircraft and weapons, but principally are a result of the desired effect against the target or system of which it is a part. An objective of achieving a specific effect on the larger target system, rather than individual target destruction allows expansion of the number of attacks possible. A target does not necessarily have to be destroyed to achieve a particular effect.² Since they do not require large numbers of support assets, stealth aircraft multiply the number of targets that can be struck in a short period of time and combined with precision reduces the number of aircraft necessary to achieve a specific effect. Figure 1 illustrates the advantages of stealth and precision. This combination allowed a greater relative proportion of targets to be attacked than attainable with similar numbers of non-stealth aircraft. In other words, without the stealth F-117s, 76 target attacks could not have been planned.

This leverage results not only in freeing non-stealth assets to strike other targets but enables concepts of operation previously unachievable—a capacity for simultaneous attack on the entire array of high value targets with little or no need to suppress enemy air defenses. This enables tactical surprise, a larger span of influence, fewer casualties, paralyzing effects, and shorter time to impose effective control over the enemy.

Current modeling and simulation consists primarily of attrition-based algorithms that do not account for these kind of effects in design of attack strategy or in determining warfighting

² There is a risk to this approach however, as Rear Admiral (Ret) Jim Winnefeld notes: "The essential hardware in making the risk acceptable was the F-117[stealth] (and to a lesser extent, cruise missiles). Their surprise value and the ability to apply small packages of resources in precision strikes against key targets made the difference between success and failure." James A. Winnefeld, Preston Niblack, Dana J. Johnson, *A League of Airmen: U.S. Air Power in the Gulf War*, RAND, 1994, p. 43.

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outcomes. In none of the studies reviewed was the multiplier effect of stealth taken into consideration as part of the modeling or simulation process.

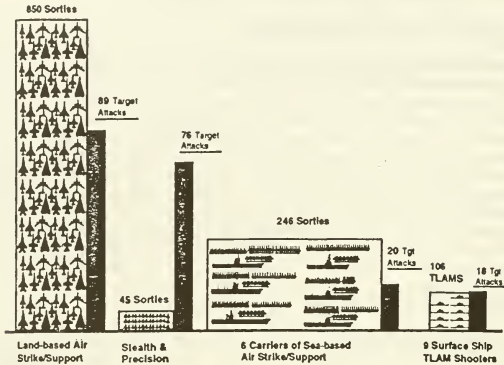


Figure 1—Stealth and Non-stealth Target Coverage 1st 24 Hours Gulf War³

One way of measuring the impact of the leverage of stealth is to compare the ratio of non-stealth aircraft sorties planned against targets (1202/127) with the ratio of stealth and associated aircraft sorties planned against targets (45/76)⁴. Calculating this value for the first 24 hours of the Gulf War results in a 'stealth multiplier' of about 16 $[(1202/127)/(45/76)]$. Another way to look at this data is one (1) stealth sortie was 'worth' approximately 16 non-stealth sorties in *target* attack planning. Targets planned for F-117s generally had a single aimpoint per target, however. Targets for non-precision non-stealth aircraft generally had more than one aimpoint and required more than one aircraft or missile per target. Since F-117s carry two bombs per aircraft, the first 24 hour attack plan shows an average of 1.16 bombs per target—far fewer than required for 'dumb' bombs. The point remains that precision requires fewer bombs per aimpoint or target and stealth reduces or eliminates the support to get to a target, therefore less resources are required to attack a target. Hence, even if number of aimpoints were substituted for the number of target attacks, there would still be a significant, if smaller stealth multiplier.

Many people and analyses assume that the contribution of stealth has limited effect when sufficient warning time exists to deploy fighter/attack aircraft into an area or after air superiority

³(S) "Operations DESERT STORM Target List and Master Attack Plan (U)," RAND, March 1992, and (S) "Master Attack Plan: First 24 Hours," 2121, 16 January 1991. Information extracted is unclassified. 'Target Attacks' are the number of lines associated with an aircraft or force package attacking a target in one of the twelve JFACC target categories on the first 24 hour master attack plan.

⁴Of the 45 sorties listed three are EF-111 sorties that were planned as part of the second group of attacks against Baghdad.

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is achieved. Analysis of the Gulf War indicates that stealth is an attribute that retains its significance, and continues to leverage offensive operations after the attainment of air superiority and as offensive operations extend well beyond the opening phases of a theater campaign. In the Gulf War, stealth remained the singular force element to attack the most highly defended areas of Iraq *throughout the war*, and as shown in figure 2 continued to provide leverage unattainable by any other asset *throughout the war* as well.

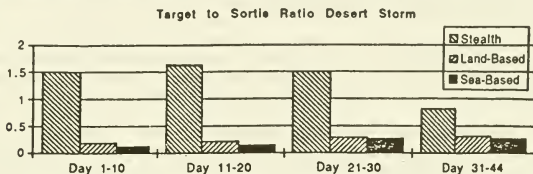


Figure 2—Stealth Versus Non-Stealth Target to Sortie Ratio Desert Storm⁵

Adversaries under attack, tend to hide and defend very heavily those targets they hold of most value. Figure 3 shows that during Desert Storm suppression of enemy air defense sorties actually *remained constant* as the war progressed. This is due mostly to risk and attrition management. As a campaign progresses, locations previously avoided because of higher threat density are attacked as enemy air defenses are subdued to levels of acceptable risk. Stealth remains relevant. Also, during later stages of a theater campaign, risks taken by air forces increase as support to ground forces becomes paramount. This drives up the requirement for suppression of enemy air defense sorties or other alternatives such as stealth to evade or nullify enemy defenses.

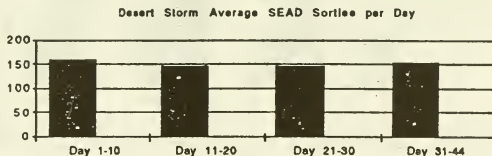


Figure 3—Suppression of Enemy Air Defense Requirements During Desert Storm⁶

As more and more of *any* particular force arrives in theater, the conventional wisdom—and many analysts—hold that incremental addition of that force element will increasingly dilute the significance of the force element. Comparing the Gulf War master attack plan for the air campaign as planned in September 1990 with the attack plan actually executed on January 17, 1991, we were able to discern the actual effects of force build-up for stealth aircraft. The

⁵(S) Operations DESERT STORM Target List and Master Attack Plan (U), RAND, March 1992, and "(S) Master Attack Plans," D-Day to D+43, 16 Jan - 28 Feb 1991. Information extracted is unclassified.

⁶Ibid.

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analysis shows that the effect of stealth was not diluted as a result of introducing more forces in the theater.⁷ In particular:

- Stealth aircraft increased by 20 percent from September 1990 to January 1991. However, stealth aircraft decreased as a percentage of the total combat aircraft available for planning from 5.2 percent (30/580) to 3.3 percent (36/1088). Target coverage increased by 46.2 percent (from 52 to 76 targets) over the September plan.
- Carrier-based non-stealth aircraft increased by 96 percent from September 1990 to January 1991. Sea-based non-stealth aircraft increased as a percentage of the total combat aircraft available for planning from 29.1 percent (169/580) to 30.4 percent (331/1088). Target coverage increased by 42.9 percent (from 14 to 20 targets) over the September plan.
- Land-based non-stealth aircraft increased by 89 percent from September 1990 to January 1991. Land-based non-stealth aircraft increased as a percentage of the total combat aircraft available for planning from 65.7 percent (381/580) to 66.3 percent (721/1088). Target coverage increased by 64.8 percent (from 54 to 89 targets) over the September plan.

With respect to number of targets attacked, the impact of stealth aircraft *grew* as the percentage of total stealth aircraft became smaller as force build-up occurred. Only the impact of non-stealth aircraft became 'diluted' as additional forces were added. The experience of the Desert Shield build-up indicates that stealth aircraft become *more* rather than *less* important as force build-up occurs. Figure 4 graphically illustrates this effect.

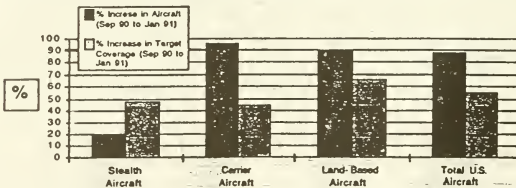


Figure 4—The Effect on Target Coverage as Force Build-Up Occurs (Stealth versus Non-Stealth)

Deep Attack Force Element/B-2 Options Trade-off Analysis:

A "capability" analysis of five B-2 force structure options and several potential force structure offsets was performed as part of the CORM deep attack issue analysis to comply with Congressional direction. A description of these options and potential offsets is at appendix 2. The analysis was led by IDA with CNA and RAND participating along with representatives from each

⁷Increase in target coverage from (S) "Master Attack Plan," 1400, 13 September 1990, and (S) "Master Attack Plan: First 24 Hours," 2121, 16 January 1991. Available U.S. combat aircraft for planning from (S) "Offensive Campaign: Phase I," JFACC Director of Air Campaign Plans brief to CJCS, 13 September 1990, Gulf War Air Power Survey Volume 5, Statistics, and DOD Conduct of the Persian Gulf War, Report to Congress. Information extracted is unclassified.

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of the Services. Synergy Corp ran additional excursions using the same methodology and assumptions as IDA. Two types of "MRC like" scenarios were considered, one of short duration with limited forces available and one of longer duration with substantial forces available. Cases were used to explore variations within each of the scenarios. To assure consistency in making comparisons, all costs in the evaluation and in this paper (except as otherwise noted) are 18 year life-cycle costs in FY 95 dollars and were computed by IDA using the same methodology. Costs for each alternative along with the cost data and assumptions for these calculations is at appendix 3.

The focus of the short duration scenario—seven days of effort with minimal warning—is on responsiveness: the ability to respond quickly to a crisis. For this scenario eight cases were analyzed to reflect varying enemy defense levels (minimal or heavy), aircraft carrier availability (zero to two), warning time, and availability of land bases. The focus of the sustained firepower scenario—thirty days with warning time to deploy fighter assets—is on ability to deliver firepower with a fully deployed force. For this scenario four cases were analyzed to reflect situations where: 1) availability of land bases is plentiful; 2) availability of land bases is reduced by 50 percent; 3) Desert Storm sortie rates are applied; and 4) sortie rates where aircraft carrier-based air is flown at equal rates to land-based air (historically, land-based aircraft fly higher sortie rates than carrier-based air)⁸.

The initial analysis was conducted using the following measures of merit: weapons delivered for the responsiveness scenario, and tons of ordnance delivered for the sustained firepower scenario. Unfortunately, neither analysis considered the effectiveness of the stealth multiplier. Using payload only measures of effectiveness show the impact of the F-117 as marginal—yet its value considering the effect of the stealth multiplier is well beyond that indicated by payload only computations. Additionally, payload-only measures ignore the significance of range required to reach a target. The total costs of additional assets (e.g. tankers and carriers) and the associated assumptions (e.g. access to near-by land bases) necessary for aircraft to reach assigned targets are substantial and not accounted for in payload-only calculations. To overcome the range deficiencies in payload only calculations, the measure of merit of work—payload times range—was used to incorporate the value of range for the summary presentation in tables 1 and 2.

The data in tables 1 and 2 is an average of the results of the individual cases for each scenario run to account for variances in warning time available, basing availability, threat density, and availability of forces. A description of each of the cases, assumptions for each, sortie rates, payloads, and ranges are at appendix 4. An understanding of each of these cases and the assumptions and construction of each is required prior to drawing any conclusions from the combined results displayed. Some table results may not appear obvious without a complete understanding of the scenario and particular cases.⁹ Table 3 shows the cost relationships among B-2 options and potential trade-offs. An entry in this chart shows the outcome (cost or saving

⁸John Birkler, David Perin, Chris Bowie, David Shlapak, James Winnefield, James Chiesa, *Roles and Functions of Land and Sea-Based Combat Air Forces: What Are the Issues in the Changed Security Environment?* CNA/RAND project memorandum, Washington, D.C. September 1994, p. 37.

⁹For example, in the responsiveness scenario the offset of reducing four F-16 wings indicates no change in munitions delivered. However, this short-warning scenario (C-Day=D-Day), presumes a relatively small number of land-based fighters are deployed and as a result even a significant change in the total land-based fighter force has no effect on the scenario outcome.

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amount) of buying a B-2 option combined with an offset. Table 4 is a summary of cost and capability for each force structure alternative analyzed in the evaluation. It shows differences in both raw payload measurements for both number of munitions dispensers and bomb tonnage as well as payload-range (work) for each scenario. At appendix 5 is a summary displaying each of the individual cases for the responsiveness scenario.

The results of the two capability-based analyses represent only a part of the many factors that need to be considered when assessing the effectiveness of alternative force structures. In addition to the work and cost calculations, a summary of contextual factors that highlight some of the unique contributions and shortcomings of the force components analyzed, but not captured in the 'trucking' calculations are shown in appendix 6.

Table 1: Responsiveness Scenario: Work Accomplished Against Mobile Targets in Seven Days (Change In Average Percentage of Dispenser-Miles)

Offsets	B-2 Options	Current Program (20)	+1.5/YR (+14 @ 2010)	+20 B-2s	+3.0/YR (+27 @ 2010)	+55 B-2s
No Offset		0	15.1	22.0	30.2	60.4
10 Carrier Force (-2) (5 /MRC BUR case)		-2.4	12.7	19.6	27.8	58.0
8 Carrier Force (-4) (4 /MRC BUR Case)		-4.8	10.3	17.1	25.4	55.5
0 B-1B Force (-4 BW) (Retire 95 B-1Bs)		-35.6	-20.5	-13.6	-5.4	24.8
16 AF FW Force (-4FW) (Retire 288 F-16s)		0.0	15.1	22.0	30.2	60.4
Replace FA-18E/F with new FA-18C/D		-4.4	2.9	6.2	10.1	24.7
Cancel FA-18E/F Use USMC FA-18C/D		-4.4	2.9	6.2	10.1	24.7

Table 2: Sustained Firepower Scenario: Work Accomplished in 30 Days (Change In Average Percentage of Ton-Miles)

Offsets	B-2 Options	Current Program (20)	+1.5/YR (+14 @ 2010)	+20 B-2s	+3.0/YR (+27 @ 2010)	+55 B-2s
No Offset		0	7.3	10.6	14.5	29.1
10 Carrier Force (-2) (5 /MRC BUR case)		-2.1	5.2	8.5	12.5	27.1
8 Carrier Force (-4) (4 /MRC BUR Case)		-4.1	3.2	6.5	10.4	25.0
0 B-1B Force (-4 BW) (Retire 95 B-1Bs)		-24.9	-17.6	-14.3	-10.4	4.2
16 AF FW Force (-4FW) (Retire 288 F-16s)		-2.1	5.2	8.5	12.5	27.0
Replace FA-18E/F with new FA-18C/D		-4.4	2.9	6.2	10.1	24.7
Cancel FA-18E/F Use USMC FA-18C/D		-4.4	2.9	6.2	10.1	24.7

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Table 3: Cost Relationships (FY95 \$Billion)—B-2 Options and Potential Offsets

B-2 Options	Current Program (20)	+1.5/YR (+14 @ 2010)	+20 B-2s	+3.0/YR (+27 @ 2010)	+55 B-2s
Offsets					
No Offset	0	Costs 17-23	Costs 22-30	Costs 29-40	Costs 52-69
10 Carrier Force (-2) (5 /MRC BUR case)	Saves 23-38	Saves 0-21	Saves 16 to Costs 7	Saves 9 to Costs 17	Costs 14-46
8 Carrier Force (-4) (4 /MRC BUR Case)	Saves 46-64	Saves 23-47	Saves 16-42	Saves 6-35	Saves 6 to Costs 23
0 B-1B Force (-4 BW) (Retire 95 B-1Bs)	Saves 26	Saves 3-9	Saves 4 to Costs 4	Costs 3-14	Costs 26-43
16 AF FW Force (-4FW) (Retire 288 F-16s)	Saves 19	Saves 2 to Costs 4	Costs 3-11	Costs 10-21	Costs 33-50
Replace FA-18E/F with new FA-18C/D	Saves 15	Costs 2-8	Costs 7-15	Costs 14-25	Costs 37-54
Cancel FA-18E/F Use USMC FA-18C/D	Saves 50	Saves 27-33	Saves 20-28	Saves 10-21	Costs 2-19

Table 4: Summary of Costs/Savings and Capability Changes—All Cases Considered

Option		RESPONSIVENESS SCENARIO				SUSTAINED SCENARIO	
		FIXED TARGETS		MOBILE TARGETS		FIXED TARGETS	
		% Ton Change	% Ton-Mile Change	% Mun. Disp. Change	% Disp-Mile Change	% Ton Change	% Ton-Mile Change
Add 1.5 B-2s per year (+14 at 2010)	Costs 17-23	7.99	12.25	7.25	15.10	2.16	7.27
Add 20 B-2s	Costs 22-30	11.63	17.82	10.54	21.96	3.15	10.57
Add 3 B-2s per year (+27 at 2010)	Costs 29-40	15.99	24.50	14.49	30.19	4.33	14.53
Add 55 B-2s	Costs 52-69	31.98	49.00	28.99	60.38	8.65	29.06
Add 2 Wings F15E	Costs 25	0.00	0.00	0.00	0.00	6.37	3.70
Reduce CVs by 2	Saves 23-38	-3.32	-2.51	-3.96	-2.37	-4.35	-2.05
Reduce CVs by 4	Saves 46-64	-6.79	-5.14	-8.10	-4.84	-8.70	-4.10
Retire 95 B-1Bs	Saves 26	-18.87	-23.27	-20.60	-35.57	-9.03	-24.88
Reduce 4F-16C/D Wings (288)	Saves 19	0.00	0.00	0.00	0.00	-5.34	-2.07
Replace F/A-18E/F	Saves 15	-6.93	-2.79	-10.18	-3.19	-5.94	-4.41
Cancel F/A-18E/F	Saves 50	-6.93	-2.79	-10.18	-3.19	-5.94	-4.41
Reduce F-22 Buy 50%	Saves 20	0.00	0.00	0.00	0.00	-2.04	-0.96
Reduce DDG-51 Buy 27%	Saves 16	0.00	0.00	0.00	0.00	0.00	0.00

NOTE: All costs above are 18 Year Life-Cycle in FY 95 dollars and were computed by IDA using the same methodology for each alternative. For factors included and assumptions for each alternative see appendix 3.

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With regard to options that increase B-2 inventory beyond current levels, the IDA led analysis summarized below concludes that additional B-2s:

- Increase capability in every scenario considered in the evaluation—demonstrating a wide range of potential force applications
- Proved very to extremely valuable when heavy defenses present
- Contribution of total tonnage depends on size of additional increment of aircraft

In addition, the IDA led analysis summary listed the following B-2 "other factors:"

- Provides every dimension of force application (except mass and around the clock attack) including surprise, range, payload, precision, and penetration of defenses
- Increases viability of regional deterrence and U.S. ability to support two simultaneous MRCs
- Increases responsiveness in short-term contingencies
- Reduces dependence on warning time, local basing, airlift, and prepositioned supplies
- Reduces the need for support allowing some support aircraft to conduct strike missions
- Has capability to acquire mobile targets with Block 30 radar
- Increases capability against a well-defended adversary far from available land bases and carriers
- Significantly increase U.S. strategies available to rapidly counter a crisis anywhere in the world
- Stealth reduces, but does not eliminate, vulnerability to some modern threats
- Forward bases with prepositioned support increase sortie rates

Bomber Industrial Base Considerations:

The function of the defense industrial base is to design and produce military equipment the nation may require in a timely manner, whether to maintain the military at its designated level, to replace unexpected equipment losses and expenditures, or to expand to a larger force. As part of this function, the defense industrial base must also function to maintain U.S. military-technological leads, and to redress any deficiencies. These capabilities are required for every weapon system type deemed important to U.S. military strategy.

The Analytical Sciences Corporation (TASC) is currently conducting a detailed analysis of the B-2 industrial base. However, we can make some observations based on other studies and industrial experiences. The B-2 is the only bomber in production and the only bomber program at a meaningful level of activity. No other bomber is planned or expected through the foreseeable future. Consequently, the B-2 program and the bomber industrial base are virtually the same. Any future bomber built after 1998 from an industrial perspective would be built from near-scratch. According to one recent study; "Given the unique requirements of the aircraft, its very low observable [VLO] characteristics, and its size, the B-2 bomber has demanded the development of a range of new technologies, components and sub components and manufacturing processes which are seriously threatened by the termination of the B-2 program at 20 aircraft. Should this industrial capability disappear, the United States will likely find it extraordinarily

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difficult to quickly reassemble the elements necessary to construct large VLO aircraft in the future."¹⁰

Ultimately, the most important consideration of why B-2 production at any level is continued is whether the U.S. needs to maintain a bomber force. With no programmed replacements, the bomber force will decline and eventually disappear. Suggestions have been made that current threat levels may permit terminating production in the short term while maintaining the capability to restart at some time in the future if then deemed a requirement. If bombers are required it is cheaper and faster to have some infrastructure to build upon in bomber manufacturing. If additional bomber force structure may be required in the next 10 to 20 years, based on B-2 critical technologies, and the experience in re-starting the B-1 just four years after its cessation in 1977, continued low rate production is a much more cost-effective option than deferring production.

Applying B-1 cost growth history to the B-2 program suggests that large restart costs for both RDT&E and production would be encountered. The motivation to terminate the B-2 line and restart would only appear to be cost-effective if it was a near certainty that America will *never* need more bombers.

Additionally, the B-1 was restarted under conditions far more favorable than would be true of the B-2. This is partly because of the aircraft itself. While the B-1 is a technological advance over the B-52, it is not a "revolutionary" change. In contrast the B-2 is dramatically different than any other aircraft. It requires a level of precision in all aspects of its fabrication and assembly which is without parallel. A recent study identified five "unique B-2 production capabilities at the prime contractor level to be at high risk upon program termination. Most, if not all of these capabilities would expire shortly after termination of the program, greatly hampering America's ability to reproduce the bomber if needed. If the B-2 production team is allowed to disintegrate, the cost to rebuild it could be a far higher percentage than was true of the B-1. It will literally take years to hire and train a workforce capable of producing a new bomber—B-2 or B-3. And in like manner, if there are design changes, the cost and time required to engineer and validate changes will be much greater."¹¹

Summary of Findings

Capability-based attributes provided by bombers and specifically the B-2:

The synergy of advanced munitions with the range and payload of long-range bombers may be more important to the Department of Defense in the years ahead than at any time during the Cold War. Combined with the stealth of the B-2, precision munitions with long-range bombers have the potential to provide key capabilities *not available from any other forces* to meet critical future national security requirements. Specifically, the B-2 provides:

¹⁰DFI International, "The B-2 Industrial Base: A Survey of Critical Capabilities," Washington D.C. January 1995, p. 55

¹¹Similar considerations of shutting down production and restarting when needed or low-rate production as they apply to submarines can be found in John Birkler, et al, *The U.S. Submarine Production Base: An Analysis of Cost, Schedule, and Risk for Selected Force Structures*, RAND, 1994.

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- 1) The potential to halt an armor invasion in a matter of days from long-range
- 2) The ability to operate unencumbered outside the reach of enemy weapons of mass destruction
- 3) Guaranteed responsiveness—independence from forward basing or carrier pre-positioning
- 4) The ability to achieve strategic or operational surprise quickly imposing wide-spread attack and paralysis upon an aggressor with minimum exposure of friendly personnel
- 5) The ability to rapidly swing from one MRC to another
- 6) The psychological impact of strike without notice
- 7) The ability to induce enough uncertainty in a potential aggressor to deter hostile activity conventionally while the U.S. is militarily engaged elsewhere or not
- 8) Greatly reduced support assets, personnel, and basing requirements to achieve equivalent effects with non-stealth and/or smaller payload, shorter range aircraft.

Economic and Personnel Leverage:

As defense spending becomes increasingly consumed by personnel costs, advanced technology weapons with low life-cycle cost can offset fewer military forces and declining defense budgets. Figure 5 is an example of how the B-2 may be economically cost-effective in addition to improving warfighting capability. Most of the focus on the issue of the B-2 has been on individual unit aircraft cost. What sometimes gets lost with that focus is return for the dollar invested. As General Horner, the overall air commander during Desert Storm noted in a statement to Congress, "...the bottom line is not dollars per aircraft, but overall capability per dollar."

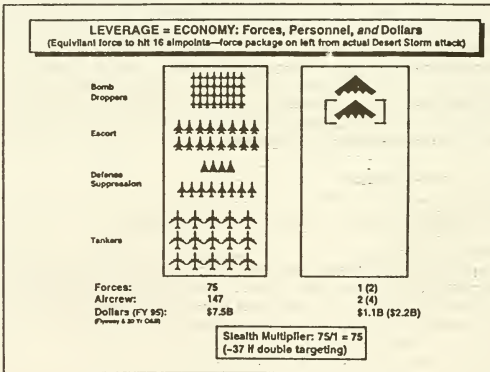


Figure 5—An Example of the Leverage of the B-2¹²

¹²From testimony of the Secretary and Chief of Staff of the Air Force to the Senate Armed Services Committee, 19 June 1991. Dollar figures adjusted to FY 95 amounts, and multiplier figure added.

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High unit cost of the B-2 has also generated questions regarding its actual use. "Would I have used a B-2 in Desert Storm? You bet I would—not only because of its enormous increase in conventional capability over any other attack system, but because we would be putting fewer lives at risk to accomplish the same mission," was General Horner's response. He went on to state; "Would I risk a B-2 in combat? Well, I didn't have any trouble risking the most expensive fighter in our inventory—the F-117—on a daily basis. And I was able to do that because we had confidence in the survivability provided by stealth. The B-2 would be no exception."¹³

Conventional Regional Deterrence:

The B-2 capabilities of stealth, long-range, high payload, and precision strike give the United States a *singular* ability among nations to respond in near-real time to short-notice contingencies using conventional force anywhere in the world. The B-2 has the possibility of extending deterrence from the nuclear to the conventional realm and may have great value in not only executing two simultaneous MRCs, but perhaps in deterring the second MRC from getting started. In a world arming with WMD (about 20 countries are developing this capability) there is great value in being able to fight from beyond the enemy's reach. This denies the enemy the ability to deter U.S. involvement in the crisis—possibly the primary reason for WMD development among hostile states. The importance of stealth, long-range, high payload, and precision strike was emphasized and embraced as critical in deterring regional states with WMD at a recent OSD sponsored gathering of experts dealing with WMD capable adversaries.¹⁴

A recent study on regional deterrence strategy concluded that when regional adversaries resort to force they "...typically seek short, cheap wars. Therefore, those U.S. military forces that can credibly deny a quick, decisive victory will be most impressive to the opponent." The same study also noted; "Prompt denial, the capability to prevent the adversary from reaching an objective, is more deterring than a rollback capability to be employed after the adversary has captured his or her objective."¹⁵ B-2s armed with advanced precision munitions have that potential.

Standoff Weapons Alternative to Bomber Modernization:

Some argue that arming older, non-stealth bombers with standoff weapons, in conjunction with surface launched cruise missiles could accomplish the same effects as penetrating stealth aircraft. Evaluation of such alternatives indicate the costs involved in attaining effectiveness equivalent to that required for even the opening phases of a MRC are prohibitive. It is also questionable—even if operationally attainable—in light of the current inability of standoff weapons to penetrate hardened targets or deal with mobile targets (e.g. tanks, SCUD launchers).¹⁶

¹³"Stealth and Desert Storm," Presentation to the Committee on Appropriations, Subcommittee on Defense, U.S. House of Representatives, 30 April 1991.

¹⁴"Deterrence of Nuclear, Biological, and Chemical (NBC) Weapons in Regional Conflicts," workshop sponsored by the Office of the Assistant to the Secretary of Defense (Atomic Energy), Deputy for Counterproliferation, McLean, VA., April 21, 1995.

¹⁵Ken Watman and Dean Wilkening, *U.S. Regional Deterrence Strategies*, RAND, 1995, p. xii., 81.

¹⁶Jasper Welch, *Conventional Long Range Bombers—How Many of What Types Do We Need? Part I and II*, 1992, 1994.

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Another recent study demonstrates the high cost of standoff weapons and concluded that when considering cost-effectiveness issues in operations, manned aircraft are much more attractive weapon systems.¹⁷

The standoff weapon argument is that such munitions like the Conventional Air Launched Cruise Missiles (CALCMs) employed by B-52Gs on the opening night of Desert Storm provide an adequate substitute for the B-2's ability to penetrate near or over targets and attack them with direct-attack weapons like the Joint Direct Attack Munition (JDAM). While CALCM-class precision weapons allow B-1s and B-52s to fire from outside the reach of enemy air defenses, both older bombers can attain equivalent effectiveness to a B-2 during the critical opening phases of a Major Regional Contingency (MRC).

A fundamental difficulty with this view is the high per-round cost of standoff precision munitions compared to direct-attack precision munitions. At present, CALCM and comparable cruise missiles cost over \$1 million a round. At these prices, precision standoff weapons with sufficient range to enable older bombers to have comparable survivability to a B-2 cost 15-25 times as much as direct-attack munitions. This cost differential means that for campaign-level tasks, the cost of a non-stealth bomber force relying primarily on standoff precision becomes excessive. As Figure 6 illustrates, even if only half the munitions expended by older bombers are standoff, the expenditure cost of some \$15 billion after 30 days is so high—considering past DOD munitions funding priorities—that the likelihood of DOD purchasing sufficient quantities of standoff weapons for the campaign is remote. During Desert Storm less than 8% of the some 230,000 munitions expended during 43 days of coalition air operations were precision guided. Yet the small percent of precision weapons accounted for around 80% of the estimated \$2.5 billion expended by coalition air forces.¹⁸ Standoff precision weapons usage was terminated relatively early during the Gulf War due to high cost concerns relative to the use of reusable stealth assets in the same areas.¹⁹

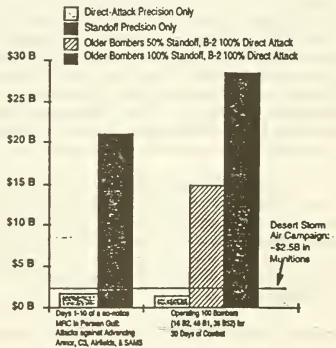


Figure 6—Standoff versus Direct-Attack Costs²⁰

¹⁷Chris J. Bowie, K. Braich, Lory Arghavan, M. Agmon, M. Morris, *Trends in the Global Balance of Airpower*, RAND Corp., 1995, pp. 73-80.

¹⁸Data from *Gulf War Airpower Survey*.

¹⁹TLAM launches were suspended on 1 Feb 1991, with 28 days (65 percent) of the Gulf War remaining.

²⁰Data from Jasper Welch, *Conventional Long Range Bombers, 1994*. Advanced precision anti-armor munitions are included in the first ten day no-notice case that are not included in the 30 days of combat example.

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Technology can be expected to bring some decrease in the per-round cost of standoff precision weapons in the decades ahead. However, there are no technologies on the horizon that postulate or promise cost reductions large enough to erase the present 15 to 25 fold cost advantage of direct-attack precision weapons. In this regard it is sobering to note that when the Tri-Service Standoff Attack Missile (TSSAM) was canceled, the unit price had reached \$2.5 million per round.²¹ Barring unforeseen breakthroughs, standoff weapons do not appear likely to enable older bombers to achieve the campaign effectiveness of stealthy platforms delivering direct-attack weapons for the foreseeable future. The greater effectiveness of direct-attack weapons against hardened or underground targets only reinforces this judgment.

Assumptions of acting on warning:

The DOD annual report states that "History shows that the location and timing of aggression often cannot be anticipated, even large scale attacks."²² Theoretically, the U.S. could act on warning to deploy troops and carrier and land-based fighters that could also support non-stealthy bombers to a rapidly unfolding crisis. However the U.S. record of timely taking action on strategic warning is poor. Pearl Harbor, Korea, the Suez Crisis, the Tet Offensive, the 1967 and 1973 Arab-Israeli wars, the fall of the Shah of Iran, the fall of the Berlin Wall, and the 1990 invasion of Kuwait are just some examples of instances where the U.S. was surprised. Scholars on the subject believe that; "For hedging against sudden attack, less promise lies in solutions aimed at reducing the probability of surprise than in those that make plans, strategies, and operational doctrines effective if surprise occurs."²³

It is often difficult to sort out what is going on before a crisis occurs. When a crisis situation is realized, our political process is not designed for swift action. Internal (congressional and popular support) and external coalitions must often be formed prior to deployment of large numbers of forces to an area. Additionally, movement to an area is often inhibited because of fear of escalation. Potential adversaries will capitalize on these realities by masking their intentions to reduce the amount of warning time the U.S. needs to conduct large force deployments. In the future these situations will be compounded by the proliferation of ballistic missiles and WMD, and potential aggressors' belief that they can seize their objectives before the U.S. would risk intervention with sufficient force to stop an invasion.

Deploying large numbers of land forces to respond on warning places great strain on declining military budgets not funded for unforeseen contingency operations. Relying principally on land forces for contingency response also allows an adversary to 'pulse' U.S. response, driving up costs through personnel intensive deployments and desensitizing the U.S. to the timing of actual hostile action in a manner similar to the Egyptians lulling the Israeli's into a false sense of security prior to the October War of 19 3. This was a concern surrounding the U.S. deployment in response to the 1994 Iraqi mobilization.

The probability of America's acting upon warning of overt aggression is diminishing. The U.S. will be hesitant to send troops into harm's way because of questions over the importance of

²¹ Bradley Graham, "Missile Project Became a \$3.9 Billion Misfire," *Washington Post*, 3 April 1995, p. A8.

²² William J. Perry, Annual Report to the President and the Congress, February 1995.

²³ Richard K. Betts, *Surprise Attack: Lessons for Defense Planning*, The Brookings Institution, Washington, D.C., 1982, p. 4.

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our vital interests involved, because there is no certain counter to the WMD threat to deploying surface forces, or a variety of other concerns. Long-range stealth bombers with armor stopping munitions provide a unique cost-effective capability that overcomes these inhibitions that otherwise limit national security decision-making options, and may actually increase the probability of acting on warning since large personnel movements are not involved. Because of its responsiveness, a B-2 force can be placed on alert to conduct operations without the elaborate and potentially escalatory arrangements needed to deploy short-range theater forces. Increased levels of B-2 readiness can be conducted quietly (to minimize the potential for escalation) or overtly (to illustrate U.S. concern). This kind of crisis management potential provides decision-makers with national security options previously not available.

Sizing of bomber force structure:

Analytically, there is no 'correct' number. The bottom up review postulated a *minimum* warfighting requirement of 100 deployable bombers. However, this number is based on a strategy requiring bomber forces to 'swing' from one MRC to another in the event of conflict. The head of the Air Combat Command has labeled this untested strategy "risky."²⁴ Consequently many factors drive the sizing of the U.S. bomber force. Some of these include: suitability for regional employment; the value of being able to engage quickly (see figure 7); regional threat potential; reduced likelihood of sufficient forces in-place; future conventional forces; complementary use of force (early use of B-2, followed by supplement of non-stealth bombers, and follow-on arrival of sea and land-based fighters and ground forces.)

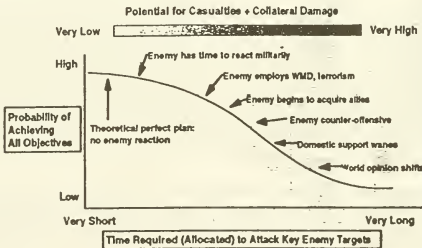


Figure 7—Time Value of War

Congress expressed an interest in the potential synergy of complementary use of aircraft carriers and long-range bombers. Neither bombers or carriers require land-bases in-theater to operate. Several potential combinations of bomber-carrier operations are possible. For example, stealthy B-2 bombers could provide suppression of enemy air defenses (SEAD) for non-stealthy carrier-based aircraft. Conversely, the use of aircraft carrier aviation to provide SEAD could

²⁴ John D Morrocco, "B-2s Future Hinges on Debate Over Cost," *Aviation Week & Space Technology*, April 17, 1995, p. 54.

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enable use of non-stealth bombers to the extent that carrier-based air could reach targets of concern. Range limitations of carrier-based air without refueling will generally restrict providing SEAD for non-stealth bombers to distances much less than what bombers are capable of reaching. In early stages of a conflict carrier-based air range limitations become more acute when concerns of fleet defense tend to keep carriers further away from potential land and sea-based threats (as demonstrated during the Gulf War and reaffirmed during recent joint exercises).²⁵ Land-based tankers are one means of extending sea-based air ranges. The presumption of land-based tankers generally means that land-based combat aircraft will also be available.

To stop an armored invasion of moderate size in about two weeks from a cold start, current bombers require varying degrees of upgrading and higher inventories of advanced conventional munitions to be effective. How well these upgrades will perform and how much cueing they will need from theater reconnaissance, including JSTARS, is a matter of development and testing. Moreover, the older bombers' lack of stealth limits their usefulness and their survivability in areas of high enemy air defenses—regardless of what stage of the war is on-going. Aircraft carrier deployment speed and numbers of strike aircraft may restrict their ability to halt MRC-size armored invasions by themselves. Carrier strike aircraft are non-stealth (until JAST comes on-board) and require large support packages to penetrate well-defended airspace further reducing aircraft available for strike.²⁶ Land-based fighters require access to in-theater bases and non-stealth fighters also require large support packages to penetrate well-defended airspace. If only the bomber force can perform the task of stopping an armored invasion, and other tasks early in an intervention like SEAD, strategic attack, and destruction of an enemy's WMD delivery capability, what is their appropriate composition?

If procuring and upgrading B-2s is more cost-effective over the next 20 years than other means of projecting effective force early in a conflict, then continued low-rate production of the B-2 may be the best investment path. Some B-52s with standoff weapons, and B-1s for direct delivery in low to moderate threat areas could serve as the backup to a growing B-2 force. How large the B-2 force should eventually become depends upon the evolving threat potential and the effectiveness of programmed and future B-2 upgrades. The most rigorous analyses on the subject suggests that total inventory numbers on the order of 50 to 60 B-2s can provide the U.S. greatly enhanced strategic and operational alternatives.²⁷ Evaluation of offsets indicate that this is also a cost-effective alternative, and in some cases may result in a significant increase in force application capability with significant budget savings (see tables 3, 4 and appendix 2).

Balance of major force elements:

Bombers, land-based and carrier-based fighters each have a set of unique attributes. Some of these qualities are shared by other elements of this airpower "triad" while others remain unique. Fighters and bombers are both major force elements available to meet the emerging challenges of the future security environment as are the other major force elements displayed below.

²⁵Planning Guide on Carrier and Carrier Air Wing Employment in Joint Fleet Exercise 95-2, February 1995.

²⁶SEAD/EW accounted for about 20 percent of Gulf War carrier-based theater, maritime strike, and SEAD sorties. *Statistics of Carrier Fixed-Wing Flight Operations During Operation Desert Storm*, CNA report CIM 166, 1991.

²⁷See (S) *Providing an Effective Bomber Force for the Future*, Rand, 1994, and Jasper Welch, *Conventional Long Range Bombers—How Many of What Types Do We Need?* Part I, 1992 and II, 1994.

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Major Conventional Force Elements (2000)²⁸

5 Non-Stealth Bomb Wings (161 aircraft)	36 Fighter Wings (2334 aircraft)
22 Divisions	12 Aircraft Carrier Battle Groups
21 Independent Brigades/ACRs	11 Amphibious Ready Groups
55 Attack Submarines	59 Aegis Surface Ships (more programmed)
1 Stealth Bomb Wing (16 aircraft)	

The uncertainties involved in any combat operation require that we maintain a mix of robust capabilities from an increasingly smaller force structure. Given the current trend of reduced military forces and lower defense budgets, prudence and common sense would suggest adjusting the balance of major force elements considering those providing equivalent or greater combat capability with lower life-cycle cost (see figure 8). The best insurance for an uncertain future lies in a balance of forces—our current plans are heavy with traditional forces and light in capitalizing on the value and capability of long-range, high-payload, stealth. It is clear that as weapon system modernization occurs those systems that the DOD should procure and improve are those that provide the greatest addition to deterrence and warfighting capability for their investment.

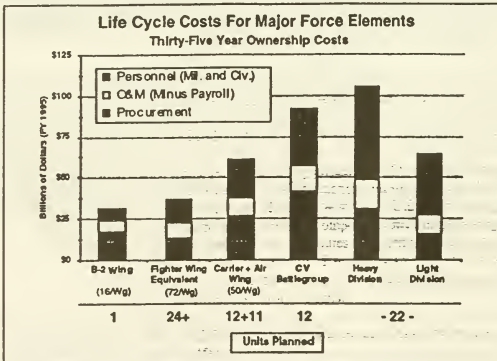


Figure 8—Life-Cycle Costs of Some Major Force Elements²⁹

²⁸ Aggregations of forces include all Services where applicable, for example fighter wings include Air Force, Navy, and Marine aircraft. Divisions include Army and Marine. Totals include active and reserve components.

²⁹ Data from "Military Force Structure Planning Study," Lockheed Analytical Group, 1994, SecDef Annual Report FY 1995. B-2 cost data from USAF cost estimates.

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As part of the Commission staff study, investment priorities in the current FYDP were reviewed. The current DOD investment plan for aircraft modernization is illustrated in figure 9

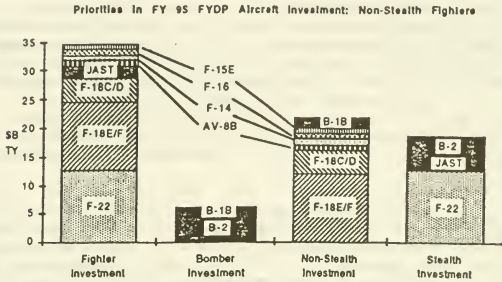


Figure 9—Aircraft Investment Priorities in FY95 FYDP³⁰

It appears that current DOD investment priorities are still affected by decisions made prior to the emergence of new security realities and require adjustment if the attributes embraced by the Commission are accepted as relevant for shaping DOD's future. *Over the course of the FY95 FYDP, the administration plans to spend almost seven times more on fighters than bombers. Following the FYDP, no new bomber procurement is currently planned. Furthermore, over the FYDP we are spending more money on non-stealthy, current generation fighters than we are on stealthy fighters and bombers combined. In short, the administration plans almost by default to rely on fighter aviation to replace the bomber force. Under current plans the bomber force will inevitably erode in both size and capabilities.*

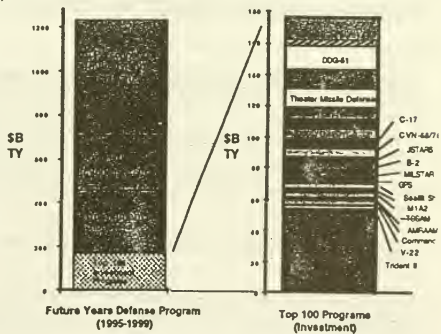


Figure 10—FY 95 FYDP and Top Investments³¹

³⁰Selected Weapons Costs from the Presidents 1995 Program, Congressional Budget Office, 1994.

³¹Ibid.

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Operational Modeling and Analysis:

Review of the variety of analyses conducted regarding air operations in general and bomber forces in particular indicate that the analytic community and most military force planners have not adequately modified their modeling and simulation tools to account for the multiplier effect of the combination of stealth and precision or for the potential of an effects-based targeting methodology. For the most part the significance of the combination of stealth and precision is under appreciated and analysts are still captured by the traditional attrition-based approach to campaign modeling. Using traditional destruction-based measures of effectiveness, modeling of F-117 performance would show its payload contribution marginal relative to large deployment of fighters (relatively small payload and few numbers). Yet during our latest MRC it was the most effective and highly leveraged aircraft participating and a key element of our success.

During the Commission evaluation no analytic models or simulations were encountered that incorporate targeting to achieve systemic effects against particular target systems. This is a serious deficiency in state-of-the-art campaign modeling and analysis and may have severe consequences in limiting the evaluation and production of innovative technologies, systems, and concepts with the potential for dramatically leveraging DOD capabilities for the future. We need to make sure we correctly analyze what best contributes capability to accomplish desired effects in the future, and not revert to outmoded, but convenient analytic tools of input-based rather than output-based measures of effectiveness.

*Option Evaluation Summary***OPTION 1—Endorse termination of U.S. bomber production (current program)**

PRO: Does not require additional funding or offsets.

CON: Terminating production of bombers as a major force element of American defense strategy halts modernization and limits a *singular* U.S. capability. By 2011 bombers will be the oldest major force element in the U.S. inventory.³² A decision not to build more B-2s foregoes American aerospace competitive advantage in long-range high payload stealth. The B-2 possesses all the attributes the Commission has found relevant to shaping America's defense needs for the future. Stopping production of the B-2 limits America's future ability to project influence around the world. Over the long term, costs money and limits strategic and operational national security options.

OPTION 2—Recommend continued production of the B-2 without comment on size or offsets

PRO: This option allows the Commission to provide specific comment on a system that encompasses all the attributes you found desirable for forces and operational concepts in the 21st Century without getting into DOD's business of force sizing or trade-off selection (see figure

³²"Defense in the Late 1990s: Avoiding the Train Wreck," The Center for Strategic & International Studies, Washington: D.C., 1995, p9.

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11). The B-2 is the key to the future of the U.S. bomber force and enhances our ability to rapidly project power anywhere in the world. Seven former Secretaries of Defense believe the B-2 is the single most cost-effective means of rapidly projecting force over great distances, and have stated so to the President.³³ The preponderance of bomber studies and analyses reviewed, and the Commission staff evaluation suggests that more B-2s are a cost-effective way to enhance our future national security needs in an uncertain security environment. This option articulates what the Department of Defense may be institutionally hesitant to do considering that a long-range stealthy bomber with all weather precision capability provides a means of force application that challenges *all four Services'* traditional institutional force structure sizing mechanisms.

CON: Takes a position different from current DOD plans. Implies additional funds or offsets must be identified.

OPTION 3—Recommend additional B-2 production at a low rate (1.5 or 3 B-2s per year)

PRO: Low rate production of the B-2 provides the U.S. a hedge against uncertainty until the security environment becomes more defined, preserves America's aerospace technological leadership, bomber industrial base, and sustains U.S. responsive power projection capability by gradually replacing older bombers with newer ones providing much greater force, personnel, and economic leverage. A decision on the ultimate size of the B-2 force can be made when U.S. understanding of the post-Cold War security environment becomes clearer. Additionally, the benefits of low-rate production include continued capitalization on B-2 research and development investment; maintenance of a stable, skilled, and efficient work force, and keeps annual funding low enough to allow other modernization programs to remain on track. Studies of the sustained acquisition of capital ships and submarines show that low-rate production can provide a robust, modern, and affordable force. Additional inventory in the year 2010 as a result of a 1.5/yr. and 3.0/yr. production rate are 14 additional/11 combat coded, and 27 additional/22 combat coded respectively.

CON: Not programmed in current DOD budget plan. Requires funding and affects budgets for 1996 and beyond. Future means for long-range stealth high payload force application may not feature large bombers.

OPTION 4—Recommend a specific B-2 force size objective

PRO: As U.S. overseas bases close and more forces are withdrawn, our response to unpredictable regional conflicts will come increasingly through power projected from the U.S.. Capitalizing on a cost-effective means of rapidly projecting force from the U.S. through a high rate production buy of a specific number of B-2s is an economical option over the long-term. Increasing the balance of major force elements away from high life-cycle cost systems to lower life-cycle cost systems with greater combat capability allows the U.S. to obtain more combat power from reduced budgets. The most analytically rigorous and complete studies to date on B-2 force sizing, suggest that the planned force of 20 B-2s are not adequate to meeting the demands of a two MRC strategy. A total force of 40 to 60 B-2s facilitate a two MRC strategy and meet

³³Melvin Laird, James Schlesinger, Donald Rumsfeld, Harold Brown, Caspar Weinberger, Frank Carlucci, Dick Cheney, Letter to the President of the United States, January 4, 1995.

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the demands of the current and emerging security environment. Evaluation of offsets indicate that alternatives are available that can cover B-2 buys up to 55 additional aircraft that may result in a significant increase in force application capability along with significant budget savings over the long term.

CON: Providing specifics on force sizing is a difficult and uncertain process particularly in a climate of change. Current planned and programmed force will require offsets to fund additional bombers within current budget levels. High individual unit B-2 procurement cost. (Approximate 18 year total cost estimates corresponding to an additional 14 to 55 B-2s are: 17 to 69 billion FY 95 dollars.)

CRITERIA OPTION	18YR Cost (1995 \$B)	Respon- sive- ness	Robust- ness	Innov- ation	Com- peti- tion	Coop- eration	Effici- ency
Baseline	0	0	0	0	0	0	0
Build @ 1.5/yr (+14 @ 2010)	17 to 23	+	+	+	+	+	+
+20	22 to 30	++	++	+	+	+	++
Build @ 3.0/yr (+27 @ 2010)	29 to 40	++	+++	+	+	+	++
+55	52 to 69	++	+++	+	+	+	+++

Figure 11—OPTION EVALUATION SUMMARY

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APPENDIX 1: Bomber and Force Structure Studies Reviewed as Part of CORM Deep Attack Evaluation

A. 2 MRC SCENARIO: FORCE CAPABILITY STUDIES

1. The Bottom-Up Review (BUR): *Forces for a New Era*, Secretary of Defense, 1993
2. Portions of (S) *Nimble Dancer—CJCS's 2 MRC Wargame*, Conventional Forces Analysis Division, J-8, Nov 1994
3. (S) *Two Nearly Simultaneous Major Regional Conflict (MRCs) Warfighting Analysis*, PA&E, General Purpose Programs, 1994
4. (S) *Air Power in Two Nearly Simultaneous Major Regional Contingencies*, AF Studies and Analyses Agency (AFSAA), Aug 1994
5. (S) *Land-Based Airpower (Two Major Regional Conflicts)*, HQ ACC, 1994
6. (S) *Contribution of Land and Sea-Based Air Power to a MRC*, AFSAA, May 1994
7. *U.S.A.F. Force Structure Studies*, McDonnell Douglas, 1992-1994

B. BOMBER FORCE STRUCTURE STUDIES

8. (S) *OSD Heavy Bomber Study*, IDA, May 1995
9. (S) *Bomber Flexibility Study*, Rand, Feb 1995
10. (S) *Near Simultaneous MRC; Assessing the Contributions of the Bomber Force - 2014*, BDM Federal Inc., 1995
11. *The B-2 Bomber, A Study in Future Strategic Utility*, National Institute for Public Policy, 1995
12. *Combined Arms Study Force Structures*, Boeing Defense and Space Group, 1995
13. (S) *SWA Thunder Campaign Analysis*, Rockwell Aerospace, 1995
14. *Conventional Long Range Bombers—How Many of What Types Do We Need? Part I and II*, Jasper Welch, 1992, 1994
15. (S) *Future Bomber Force Study*, Rand, 1994
16. *B-1B IDA Review*, Rockwell, 9 Nov 1994
17. (S) *Bombers in the 21st Century*, (AFSAA), Sep 1994
18. *Force Size and Structure: The Bomber Mix*, Burdeshaw Associates, Ltd., 18 July 1994
19. (S) *Whither the Bomber Force? the Budget Crunch and the "New World Order,"* Rand, 1993
20. *The Need for Bomber Forces*, ANSER, 1992

C. GENERAL FORCE STRUCTURE STUDIES

21. (S) *Assessment of the Tactical Effectiveness of Baseline Strike Systems in the Joint Land Battle*, CNA 1995
22. (S) *Sea-Based Firepower for the Joint Land Battle: Profiling the 2005-2010 Leading-Edge Forces*, CNA, 1994
23. *Military Force Structure Planning Study*, Lockheed, Fort Worth, 1994
24. *The New Calculus, Analyzing Airpower's Changing Role in Joint Theater Campaigns*, Rand, 1993

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APPENDIX 2: List of Options and Potential Offsets

1. Low rate production of B-2 @ 1.5 per year.
 - Based on a decision in FY 96 to begin buying more B-2s (first delivery 2001)
 - Results in 14 total aircraft inventory (TAI) by 2010, 11 combat coded (CC)
2. Buy 20 B-2s (resulting total B-2 inventory = 40)
 - Number of TAI bombers eventually increase from 181 to 201
 - Rate of production 1.5-3.0 per year starting in 1998
3. Low rate production of B-2 @ 3.0 per year.
 - Based on a decision in FY 96 to begin buying more B-2s (first delivery 2001)
 - Results in 27 total aircraft inventory (TAI) by 2010, 22 combat coded (CC)
4. Buy 55 B-2s (resulting total B-2 inventory = 75)
 - Number of TAI bombers eventually increase from 181 to 236
 - Rate of production 5.0 per year starting in 1998
5. Add 2 wings of F-15Es
 - Number of total (active and reserve) Air Force FWEs increase from 20 to 22

Year	98	99	00	01	02	03	Total
Quantity	12	24	36	36	24	12	144
6. Reduce 2 Aircraft Carriers (total carriers go from 12 to 10)
 - Equates to 5 carrier per MRC BUR requirement
 - Reduce carrier wings from 10 to 8
 - Adjust F/A-18E/F procurement accordingly
 - Excursion was also costed that retires 8 other ships in the associated carrier battle group and postpones CVN-77 indefinitely.
7. Reduce 4 Aircraft Carriers (total carriers go from 12 to 8)
 - Equates to 4 carrier per MRC BUR requirement
 - Reduce carrier wings from 10 to 6
 - Adjust F/A-18E/F procurement accordingly
 - Excursion was also costed that retires 8 other ships in the associated carrier battle group and postpones CVN-77 indefinitely.
8. Retire Entire B-1B Force (95 B-1Bs)
 - Number of total bombers decrease from 181 to 86
 - Accomplished over two years starting in 1996
9. Reduce 4 F-16 C/D fighter wings (288 F-16s)
 - Total Air Force fighter wings go from 20 to 16
 - Over four years starting in 1996
 - Two wings from active force (13 to 11), two wings from national guard (7 to 5)
10. Adjust planned F/A-18E/F program:
 - A. Replace planned F/A-18E/Fs with new F/A-18C/Ds
 - Keep F/A-18C/D line open instead of replacing it with a new F/A-18E/F production line in 1998
 - B. Use USMC F/A-18Cs to fill USN carrier requirements per USN/USMC agreement until JAST
 - Use money saved to accelerate JAST to provide Navy a stealth capability sooner
11. Cut F-22 buy 50 percent (from 442 to 221 total aircraft)
 - Reduce quantity purchased each year by 50 percent
 - Maintain force structure by retaining 2 wings of F-15 Cs
 - Buy approximately 36 F-15Cs to maintain force.
12. Cut DDG-51 buy 27 percent (15 ships—50 percent of buy remaining)
 - Maintain 15 FFG-7 frigates in the fleet through 2013
 - Add VLS capability to 8 DD-963 Spruance class destroyers

May 3, 1995

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APPENDIX 3: COST ASSUMPTIONS

(18-year life cycle costs for FY1996-2013, in billions of FY 95 dollars)

DESCRIPTION	COST	ASSUMPTIONS
Add 20 B-2s	+22-30* (ACQ: 17-22, O&S: 5-8)	Costs include direct plus indirect O&S, R&D, and Procurement First buy assumed to occur in FY96
Add 55 B-2s	+52-69 (ACQ: 40-50, O&S: 12-19)	Actual Cost will depend on the following factors: Production rate, Deployment plans, Basing plan, Cost to restart production, Aircraft maintenance
Add 2 F-15E Wings	+25 (ACQ: 13, O&S: 12)	Costs include direct plus indirect O&S, R&D, and Procurement First buy assumed to occur in FY96, last in FY01 Procurement costs are based on: "Cost Estimate for Future Tactical Aircraft Forces," IDA Document D-1430, Draft, August 1994 Procurement factor = 1.4 Lead Time = 2 years
Reduce CVs by 2	-23 (ACQ: -4, O&S: -19)	Reduce carrier force from 12 to 10. Retire one CV with air wing per year starting in FY96 Costs include direct plus indirect O&S, R&D, and Procurement Forces include F-14D, F-18C, E-2C, S-3B, SH-60, HH-60
Reduce CVBGs by 2 and postpone CV-77 indefinitely	-38 (ACQ: -10, O&S: -28)	Each CVBG eliminated contained: 2 Ticonderoga-class AEGIS Cruisers 2 Arleigh Burke-class AEGIS Destroyers 2 Spruance-class Destroyers 2 Los Angeles-class Submarines
Reduce CVs by 4	-46 (ACQ: -15, O&S: -31)	Reduce carrier force from 12 to 8. Retire one CV per year starting in FY96. Reduce air wings from 10 to 7. Costs include direct plus indirect O&S, R&D, and Procurement Forces include F-14D, F-18C, FA-18C (N&R), FA-18E/F, E-2C, S-3B, SH-60, HH-60. Postpone CVN-77 indefinitely. First new start CVN replacement occurs after 2013
Reduce CVBGs by 4	-64 (ACQ: -17, O&S: -47)	Each CVBG eliminated contained: 2 Ticonderoga-class AEGIS Cruisers, 2 Arleigh Burke-class Destroyers, 2 Spruance-class Destroyers, 2 Los Angeles-class Submarines
Retire B-1B Fleet	-26 (ACQ: -6, O&S: -47)	Costs include direct plus indirect O&S, R&D, and Procurement CMUP R&D from DPP (PB FY96)
Reduce F-16C/D Wings by 4	-19 (ACQ: -6, O&S: -17)	Costs include direct plus indirect O&S, R&D, and Procurement Two active and two reserve wings retired over 4 years
Reduce the F-22 buy by 50%	-20 (ACQ: -21, O&S: +1)	Costs include direct plus indirect O&S, R&D, and Procurement F-15Cs substituted 1-for-1 for the F-22 ~36 additional F-15Cs bought to maintain force structure
Replace F-18E/F buy with new F-18C/D	-15 (ACQ: -13, O&S: -2)	Costs include direct plus indirect O&S, R&D, and Procurement Marines retain F-18Cs Included R&D costs may not have captured all F-18E/F aircraft F-18C substituted 1-for-1 for the F-18E/F to maintain force structure
Cancel F-18E/F	-50 (ACQ: -40, O&S: -10)	Marine F-18Cs fully integrate into carrier deployment cycles to maintain carrier air wing structure until JAST can replace. May require extension of service life on some USN F-18Cs
Reduce DDG-51 by 50%	-16 (ACQ: -14, O&S: -2)	15 Ships (based on lead time of 3 years) Costs include direct plus indirect O&S, R&D, and Procurement DPP procurement to 55 ships reflected in this estimate 15 FFG-7s maintained to replace deleted DDG-51s Includes \$0.4 B to add VLS to 8 DD-963 Spruance Class Destroyers

*NOTE 1: B-2 cost figures are highly dependent upon the list of factors included in their calculation. For comparison to the IDA figures, Air Force figures for adding 20 B-2s run from \$12.8 B (Recurring Flyaway \$FY95) to \$25.7 B (20 Year Life Cycle). Northrop Grumman cost proposals are less.

NOTE 2: Procurement takes into account spares as well as new system acquisition costs.

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APPENDIX 4: Description of Cases, Sortie Rates, Aircraft Ranges, and Costs Used in B-2 Option and Potential Offset Evaluation

DESCRIPTION OF CASES

MISSIONS/SCENARIOS

(7 Days of Combat) (8 Cases)

DEFENSES			
WARNING	FORCES	MINIMAL (Support Packages Not Needed)	HEAVY (Conventional Bombers Need Escort/SEAD Support)
MINIMAL C-DAY = D-DAY	BOMBERS ONLY	A - INITIAL STRIKE ORIGINATES AT CONUS BASES WITH RECOVERY AT FORWARD BASES - STRIKE FORCE: 100 BOMBERS	E - ONLY STEALTH BOMBERS (B-2s) CAN BE USED - EITHER CARRIER UNAVAILABLE OR TARGETS BEYOND RANGE OF CARRIER STRIKE AIRCRAFT - STRIKE FORCE: 16 B-2s
	ADD ONE CARRIER	B - PROBABILITY CARRIER IS PRESENT DEPENDS ON NUMBER OF CARRIERS IN FLEET - LAND BASES NOT AVAILABLE - STRIKE FORCE: 100 BOMBERS AND 50 F/A-18s	F - IF CARRIER IS PRESENT IT IS USED TO SUPPRESS DEFENSES AND ESCORT BOMBERS; NO NAVY STRIKE MISSIONS - B-1Bs AND B-52Hs AVAILABLE FOR STRIKE - IF CARRIER PRESENT - STRIKE FORCE: 16 OR 100 BOMBERS
	ADD LAND- BASED FIGHTERS	C - F-15E, F-16C, F-117 BEGIN DEPLOYING ON D-DAY, ASSUME WEAPONS, FUEL, AND CREWS AVAILABLE ON ARRIVAL - STRIKE FORCE: 100 BOMBERS, 50 F/A-18s, AND 112 AF FIGHTERS (70 F-16Cs, 30 F-15Es, and 12 F-117s)	G 50 PERCENT OF F-16Cs USED TO FLY ESCORT AND SUPPRESS DEFENSES - ALL TLAMS AND 50 PERCENT OF CARRIER STRIKE AIRCRAFT USED FOR SEAD AND AIR ESCORT - STRIKE FORCE: 100 BOMBERS, 25 F-18s, AND 77 AF FIGHTERS
EXTENDED (NO LAND AIR BASES MADE AVAILABLE IN COMBAT AREA)	BOMBERS AND TWO CARRIERS	D - TWO CARRIERS, EACH AUGMENTED WITH AN F/A-18 SQUADRON ARE PRESENT - BOMBERS FORWARD DEPLOYED PRIOR TO D-DAY - STRIKE FORCE: 100 BOMBERS, 124 F-18s	H - ALL TLAMS AND ONE HALF OF CARRIER STRIKE AIRCRAFT USED EXCLUSIVELY FOR DEFENSE SUPPRESSION AND AIR ESCORT - ALL REMAINING F/A-18s USED FOR STRIKE - STRIKE FORCE: 100 BOMBERS, 62 F/A-18s

NOTES:

- A** REFERS TO CASE A
- STRIKE FORCE IS SPECIFIED FOR THE CURRENT PROGRAM. IT WILL CHANGE AS A FUNCTION OF OPTION. FOR EXAMPLE, OPTION A WILL ADD 16 B-52s TO EVERY STRIKE FORCE.
- TWO NOMINAL WEAPON LOADS MEASURED IN
 - NUMBER OF 1000 LB CLASS SUBMUNITION DISPENSERS (E.G., WCTMDs) DELIVERED IN 7 DAYS
 - NUMBER OF TONS DELIVERED IN 7 DAYS
- SURGE SORTIE RATES USED FOR FIGHTERS

SORTIE RATES AND WEAPON LOADS **RESPONSIVENESS SCENARIO**

AIRCRAFT TYPE	SORTIES/ AIRCRAFT/ DAY	WEAPON LOAD	
		1000 LB CLASS MUNITION DISPENSERS	TONS
F-15E	2.0	12	4
F-16C	2.0	8	2
F-117	0.90	2	2
F/A-18E/F	2.0/1.71 ^a	12	3
F/A-18C (N)	2.0/1.71 ^a	8	2
B-2	0.4/0.8 ^b	36	16
B-1B	0.4/0.6 ^b	30	16
B-52H	0.4/0.6 ^b	24	19

^a IF TWO CARRIERS ARE ON STATION, THEN BOTH CAN MAINTAIN A 2.0 F/A-18 SORTIE RATE. IF A SINGLE CARRIER IS ON STATION, THEN THE F/A-18s CAN MAINTAIN A 2.0 SURGE SORTIE RATE FOR 3 DAYS AND A 1.5 SORTIE RATE FOR THE OTHER 4 DAYS. THUS, THE AVERAGE SORTIE RATE FOR ONE CARRIER IS 1.7 FOR THE 7 DAY PERIOD.

^b CONUS BASED/FORWARD BASED ON D-DAY.

RESPONSIVENESS SCENARIO (RANGE/PAYLOAD ANALYSIS)

AIRCRAFT TYPE	MOBILE TARGETS			FIXED TARGETS		
	WEAPON LOAD (SUBMUN #)	UNREFUELED MISSION RADIUS (NM)	NUMBER OF TANKS/SIZE	WEAPON LOAD (TONS)	UNREFUELED MISSION RADIUS (NM)	NUMBER OF TANKS/SIZE
F-15E	12	350	1 / 610 gal	4	730	2 x 610 gal
F-16C	8	250	1 / 610 gal	2	540	2 x 370 gal
F-117 (HHH)	2	570	0	2	570	0
F/A-18E/F	12	215	0	3	540	3 / 480 gal
F/A-18C (N)	8	115	0	2	420	3 / 330 gal
B-2 (HHH)	36	~3,000	0	16	~3,000	0
B-1B	30	2,550	0	16	2,550	0
B-52H	24	2,650	0	19	2,650	0

* 1000 lb class munition dispenser containing munitions such as CEBs and SFWs (e.g., WCTMD)

Assumptions:

1. H-L-H mission with low altitude leg of 100 nm (exceptions: F-117 and B-2 fly HHH).

2. Standard day, no winds.

3. Retain tanks (if used).

4. Fuel reserves: 20 minutes (except F/A-18C: 1,500 lb/30 min)

5. Low level velocity assumptions

F-15E: 480 knots

F-18C (Block 40): 480 knots

F/A-18E: 480 knots

F/A-18C: 480 knots

B-1B: 540 knots

B-52H: 380 knots

DESCRIPTION OF CASES

~~SUSTAINED FIREPOWER SCENARIO~~

(30 Days of Combat) (4 Cases)

SORTIE RATES AND PAYLOAD		
BASING	DESERT STORM SORTIE RATES AND NOMINAL WEAPON LOADS (BASED ON GWAPS DATA)	EQUAL SORTIE RATES FOR FIGHTERS AND WEAPON LOADS APPROACHING MAXIMUM CAPABILITY
PLENTIFUL	I INTERNAL CARRIAGE ONLY FOR F-22	K - FIGHTERS HAVE SORTIE RATE OF 1.3, BOMBERS 0.6 - F-22 CARRY WEAPONS EXTERNALLY
LIMITED	J - DEPLOYMENT PREFERENCE - F-15E - A-10 - F-117 - F-22 - F-16C	L - DEPLOYMENT PREFERENCE - F-15E - A-10 - F-22 - F-117 - F-16C

NOTES:

- MEASURE OF MERIT IS TONS DELIVERED IN 30 DAYS.
- U.S. AIR FORCE IS ASSUMED TO DEPLOY 10 FWEs TO THE COMBAT AREA IN THIS NOTATIONAL MRC SCENARIO. THIS REQUIRES A ROBUST LOCAL BASING INFRASTRUCTURE. TO ACCOUNT FOR SITUATIONS WITH LIMITED LOCAL BASING, CASES ARE DEFINED THAT REDUCE LOCAL BASING TO 50% OF THE BASING NEEDED FOR THE FULL FORCE. FOR THESE CASES, ONE HALF OF EACH MARINE AIR WING AND FIVE AIR FORCE FWEs ARE ASSUMED TO DEPLOY.
- HOW SORTIE RATES VARY AMONG AIRCRAFT IS THE SUBJECT OF MUCH DEBATE. FOR THIS ANALYSIS TWO CASES ARE CONSIDERED, ONE USING DESERT STORM SORTIE RATES (SEE NEXT TWO CHARTS) AND ONE USING EQUAL SORTIE RATES.

SORTIE RATES AND WEAPON LOADS

SUSTAINED FIREPOWER SCENARIO

AIRCRAFT TYPE	DESERT STORM EXPERIENCE		EQUAL SORTIE RATES	
	SORTIES/ AIRCRAFT/ DAY	WEAPON LOAD (TONS)	SORTIES/ AIRCRAFT/ DAY	WEAPON LOAD (TONS)
F-15E	1.08	4	1.3	7
F-16C	1.29	2	1.3	4
F-117	0.74	2	1.3	2
F-22	1.44	1	1.3	5
A-10	1.45	4	1.3	8
F/A-18E	1.31	3	1.3	5
F/A-18C (N)	1.19	2	1.3	4
F/A-18C/D (MC)	1.51	2	1.3	4
AV-8B	0.95	2	1.3	4
B-2	0.69	16	0.6	16
B-1B	0.69	16	0.6	24
B-52H	0.69	19	0.6	19

ASSUMPTIONS FOR DESERT STORM EXPERIENCE

- 1) SORTIE RATES FOR EXISTING AIRCRAFT DERIVED FROM GWAPS DATABASE
- 2) F-22 SORTIE RATE 10 PERCENT BETTER THAN F-18E
- 3) F/A-18E SORTIE RATE 10 PERCENT BETTER THAN F/A-18C
- 4) B-1B CARRIES TWO BAYS OF BOMBS

RANGE/PAYLOAD ANALYSIS

SUSTAINED FIREPOWER SCENARIO

AIRCRAFT TYPE	DESERT STORM EXPERIENCE			EQUAL SORTIE RATES		
	WEAPON LOAD (TONS)	UNREFUELED MISSION RADIUS (NM)	NUMBER OF TANKS/SIZE	WEAPON LOAD (TONS)	UNREFUELED MISSION RADIUS (NM)	NUMBER OF TANKS/SIZE
F-15E	4	730	2 X 610 gal	7	350	1 / 610 gal
F-16C	2	540	2 X 370 gal	4	250	1 / 610 gal
F-117 (HHH)	2	570	0	2	570	0
F-22	1	classified		5	classified	
A-10	4	420	0	8	375	0
F/A-18E/F	3	540	3 / 480 gal	5	350	1 / 480 gal
F/A-18C (N)	2	420	3 / 330 gal	4	290	1 / 330 gal
F/A-18C/D (MC)	2	420/360	3 / 330 gal	4	290/230	1 / 330 gal
AV-8	2	225	0	2	430	2 / 300 gal
B-2 (HHH)	18	~3,000	0	16	~3,000	0
B-1B	16	2,550	0	24	2,550	0
B-52H	19	2,650	0	19	2,650	0

Assumptions:

1. H-L-H mission with low altitude leg of 100 nm (exceptions: F-117 and B-2 Fly HHH).
2. Standard day, no winds.
3. Retain tanks (if used).
4. Fuel reserves: 20 minutes (except F/A-18C: 1,500 lb/30 min)
5. Low level velocity assumptions

F-15E: 480 knots
F-16C (Block 40): 480 knots
A-10: 300 knots (no loiter)

F/A-18E: 480 knots
F/A-18C: 480 knots
F/A-18C/D: 480 knots

AV-8B: 480 knots
B-1B: 540 knots
B-52H: 380 knots

SOME ASSUMPTIONS USED IN "TRUCKING" CALCULATION

- YEAR: 2010-2015 (ALL PROCUREMENT COMPLETED)
- TO SIMPLIFY THE CALCULATIONS, IT IS ASSUMED THAT ALL AIRCRAFT CARRY THE SAME CLASS OF WEAPON. TWO SITUATIONS ARE PRESENTED
 - Aircraft Attack Mobile Targets Like Advancing Armies. The Measure of Merit is the Number of 1,000 lb Class Submunition Dispensers Delivered (SFW's, CEBs, ...). An Example of Such a Weapon is the Wind Corrected Tactical Munitions Dispenser (WCTMD)
 - Aircraft Attack Fixed Targets. Unitary Weapons Are Used and the Measure of Merit is the Number of Tons Delivered.
- AIRCRAFT WEAPON CARRIAGE
 - Two Payloads Used
 - Near Maximum Capability
 - Similar To Desert Storm Experience
 - Not Limited by Current Program
 - E.g., B-2 Bomb Rack Wired To Carry 36 WCTMDs
 - All A/C Assumed Certified for 1,000 lb Class Submunition Dispenser Like the WCTMD
- NO LIMIT ON THE NUMBER OF WEAPONS AVAILABLE
- LOGISTICS SUPPORT ASSUMED TO BE AVAILABLE WHEN NEEDED
- ALL AIRCRAFT ASSUMED TO FIND THEIR TARGETS
- DEPLOY/USE 100 FROM CURRENT BOMBER FORCE (TAI 181)
 - Sixteen B-2s, 70 B-1Bs, and 14 B-52Hs
 - Remaining Combat Coded Bombers Are Held In Reserve In CONUS for Contingency Operations and SIOP Withhold
- All PAA Aircraft Resulting From New Bomber Buy Are Added To Deployed Force (e.g., 20 B-2 Buy Increases Deployed Bomber Force To 116)

Mr. HUNTER. We'll also put in the record a letter for this hearing that was delivered from the offices of Gov. Pete Wilson, Governor of California, who was on the Senate Armed Services Committee as a member of the Senate. And I would just quote Pete's last line that I think is very relevant to this hearing:

We can still capitalize on the taxpayer's \$44 billion investment in the B-2, one that we can never recover, by manufacturing a complement of aircraft large enough to deter or defeat our adversaries while accommodating Air Force training, maintenance and modification schedules.

To achieve this goal, I pledge my full cooperation as the subcommittee undertakes the task of evaluating the Defense Department's strategic force modernization efforts. We want to thank the Governor's office for putting for that letter, and we wish we could have had the Governor here.

[The information referred to was submitted for the record:]



GOVERNOR PETE WILSON

September 12, 1996

The Honorable Duncan Hunter
Chairman
Subcommittee on Procurement
Committee on National Security
United States House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

Thank you for giving me this opportunity to share with the Procurement Subcommittee my assessment of the principle strategic and economic merits of the B-2 Advanced Technology Bomber.

If Congress accepts the Clinton Administration's recommendation to terminate this program, the United States would enter the next century with no heavy manned bombers in production for the first time since World War I. The Defense Department has furthermore never deployed a strategic aircraft with the range, payload, survivability, and multirole dimensions of the B-2. To end this system now would deprive the American people of the most sophisticated platform of the last 50 years to project the nation's air power as we confront new and uncertain security threats all over the world.

I urge the Subcommittee, in measuring the value of the B-2, to consider our most recent engagement with Iraq. Many of our NATO and regional allies would not allow the U.S. to stage any offensive operations from their territory. We faced a challenge that will surely arise again in the future: a lack of political and military support on the part of friendly nations for unilateral American air strikes to contain a regional crisis. But from a U.S. base, a B-2 could have carried several tons of precision munitions to any point in the Middle East and then returned on just one aerial re-fueling. This scenario assumes even greater importance in light of the fact that while the Air Force maintained up to 81 major overseas bases during the Cold War period, it has only 15 today.

California, as you know, serves as the industrial heartland for the B-2. At its peak in 1987, the aircraft's production line sustained 16,600 direct and 29,000 indirect jobs. The statewide vendor and supplier base, with an 80 percent woman or minority ownership rate, exceeded 4,000 companies.

The Honorable Duncan Hunter
September 12, 1996
Page two

Over the last ten years, the program has employed an average of 14,000 workers and supported 25,000 fulltime positions throughout the state.

The B-2, therefore, continues to anchor our high technology and aerospace industries as the California economy gradually recovers from the loss 525,000 defense-related jobs over the last six years. But the administration's decision to complete the program at 21 aircraft would drain at least another 20,000 people from the Golden State's labor force. By the year 2000, in-state B-2 employment will shrink to 2,800 direct and 4,300 indirect jobs under the Clinton plan. In the meantime, the vendor and supplier base has already narrowed to 499 active firms. This contraction will ultimately cost the state hundreds of millions of dollars in property tax and general fund revenues.

We can still capitalize on the taxpayers' \$44 billion investment in the B-2 -- one that we can never recover -- by manufacturing a complement of aircraft large enough to deter or defeat our adversaries while accommodating Air Force training, maintenance, and modification schedules. To achieve this goal, I pledge my full cooperation as the Subcommittee undertakes the task of evaluating the Defense Department's strategic force modernization efforts.

Thank you once again for inviting my comments. I deeply appreciate the aggressive leadership that you and your colleagues have demonstrated in trying to preserve a versatile and viable B-2 program.

Sincerely,

A handwritten signature in dark ink, appearing to read "Pete Wilson", written in a cursive style.

PETE WILSON

Mr. DICKS. Mr. Chairman, if I might just make one announcement. Tomorrow there's going to be a symposium sponsored by the Alexis de Toqueville Institute and Georgetown University in the Senate Armed Services hearing room between 9 and 12 o'clock in the Russell Building, in room 232 to talk about this.

And we're going to have some outstanding panels. Several former Secretaries of Defense.

And one final thing I would also mention: in an unprecedented letter, seven former Secretaries of Defense wrote President Clinton and said they felt—this is bipartisan—Harold Brown and others—that we ought to keep low-rate production going on the B-2.

So we have tremendous support outside of just the Congress here. Some of the very best thinkers in the history of defense in this country also recognize the importance of keeping the B-2 program alive and keeping low rate production.

Thank you.

Mr. HUNTER. Thank you. Thank you, Mr. Dicks, and thank you for the time you've given us today, taking away from your appropriations conference schedule. We appreciate it.

General Horner, there are many thousands of American families today who are grateful for your efforts, because there are kids who were wearing the U.S. uniform who came home, and survived the Desert Shield and Desert Storm operations largely because of the very effective airpower that you directed in that conflict.

So the Nation owes you a debt of gratitude. We thank you for your continuing interest in American airpower, and the floor is yours.

STATEMENT OF GEN. CHARLES A. "CHUCK" HORNER, U.S. AIR FORCE (RET.), JOINT FORCES AIR COMPONENT COMMANDER, OPERATIONS DESERT SHIELD AND DESERT STORM

General HORNER. Thank you, Mr. Chairman. I greatly appreciate the opportunity to come before you and add my voice to this discussion.

I have a statement here I'll submit, and not take your time. I have a few comments I think I want to make first. When I came home to South Carolina after the gulf war I reflected on what I had seen, because I knew since 1986 we had been in downsizing of our military, and it was appropriate with the passing of the cold war.

But I said, we must do it right. We must do it correctly. And I owe that to the future air commander who will be faced with another crisis at some point in time, because the people had given me a force of such strength, well trained and well equipped, that we did have a very positive conflict in terms of casualties and in terms of getting the job we were given done.

And I said what did I see there? What was the revolutionary aspect of Desert Storm? And it came down to things like freeing up the initiatives of the American fighting men. But, more importantly, it was also things like Stealth, precision munitions, and airpower.

And so I asked myself, what is the heart of air power, and obviously it is long-range heavy bombardment forces.

And so I said, as a country we must do this properly. We cannot take the cold war force and make it a smaller force. We must make it the proper force of the future.

And that's going to require new strategy. We're no longer going to be in the attrition warfare business, as we have been since Napoleon. We're not going to dominate the battlefield with larger forces. We're going to be rapid in our domination of the battlefield, using precision, using Stealth, and using the information that's available about the enemy.

And we saw it in the opening night of the war when we took control of the air over Iraq. That was the fundamental thing that led to the Desert Storm victories.

I said what is a system that can do that? And from the very first speech I gave after the gulf war, I talked about the B-2, and I did it right over here at a luncheon on this side of the Hill.

And I talked about the need for being able to induce shock and awe against a future enemy, rather than just beating him into the dirt and killing all their soldiers and destroying their cities.

And so I think it is important that we really examine what we do with our limited funds. And we buy those systems that the Air Force now calls the Sunrise systems, because an airplane like the B-2 is a deterrent, so you don't have to go to war, and if you do, it's an enabler.

It would allow, for example, the carrier to get close enough to be part of the battle, to have the B-2's there. So it's complementary, not competitive.

And I think it's the future. In fact, when I left London last week, I was reading an editorial. The English had just put 14 billion pounds into the European fighter program. And the editorial said, if you were at Farnborough you saw the European fighter, and it looked like all those older fighters. He said if you wanted to see the future, we saw it on Monday, when a B-2 let down through the overcast and flew around and then returned back to Montana. He said that was the future, and that's what we ought to be investing our money in.

So it is not only in the United States that people realize the value of Stealth, precision and long range.

The question always comes up, how many. And of course you can build any study you want, based on the assumption, to get whatever number you want.

I've always said that as a farmer you know when you've got too much rain or too little rain. And as a military man I know that 20 B-2's is not enough, and I know we can't afford the original force of 120. So I've always said 40 to 60 is a good number.

The question always, can we afford the B-2? And my answer is we can't afford not to have the B-2. Thank you very much.

[The prepared statement of General Horner follows:]

Prepared Statement of General Charles A. "Chuck" Horner, USAF (Ret.)
 Before the House National Security Procurement Subcommittee
 12 September 1996

During the Gulf War, I served as the Joint Force Air Component Commander for a broad coalition of nations. That experience gave me valuable insight into what the right mix of air assets would be in a well-balanced joint force. Lest I be dismissed as a general "planning for the last war," let me say up front that I am absolutely not here to advocate structuring U.S. forces to fight another Desert Storm. I do, however, feel that Desert Storm provided us—and our adversaries—a glimpse into the future of warfare. By illuminating our strengths and exposing our weaknesses, it provided keen insight for future military planning.

The Cold War ended shortly after Desert Storm, giving us an historic opportunity to rapidly incorporate the lessons learned in the Gulf and restructure our forces—especially our bomber force—for the 21st century. Unfortunately, five years later, it seems fairly clear to me that we have squandered much of the valuable insight we gained in Desert Storm. Evidence of this can be seen in many of the assumptions in the Defense Planning Guidance underpinning the 1995 Heavy Bomber Study, which justified the production of only 20 B-2s. Instead of reshaping our military to exploit our strengths and shore up our weaknesses, we've simply shrunk the Cold War force, downsizing it without "rightsizing" it. The result is a force ill-equipped to meet the challenges of the future.

To illustrate my point, I'd like to review some of the lessons of the Gulf War that should have—but clearly have not—guided our bomber modernization strategy. I'll then turn my focus to the recent crisis in Iraq, which also exposed our weaknesses and underscored the vital importance of long-range, stealthy airpower.

The Gulf War: Lessons that Should Have Guided Bomber Modernization

Surprise attack is inevitable, and therefore must be hedged against. The Heavy Bomber Study assumed our enemy would give us 14 days of unobstructed build-up time before attacking. This jibes neither with history nor military logic. We were surprised at Pearl Harbor, in Korea, and again in the Gulf. From a military standpoint, Iraq's invasion of Kuwait took us completely by surprise. We were aware that Saddam posed a military threat to his neighbors, and in late-July 1990 we knew he had moved his forces into position for an attack. Yet, we and our allies had difficulty accepting the threat before us, and when the attack came, we were ill-configured to respond. I will never forget those long dark nights in August of 1990. We struggled desperately to build up our forces knowing that at any time, the Iraqi Army could easily push across the Saudi border and capture not only the majority of the world's oil supply, but also the airbases and ports necessary for deploying our forces. Fortunately, Saddam stayed put in Kuwait, and the rest, as they say, is history. But he and other potential aggressors learned a valuable lesson: Don't give America six months.

In the years since, Saddam has tested our response capabilities with feints against Kuwait. In October 1994, for example, he moved over 70,000 troops and 1,000 tanks to the Kuwaiti border well before we could respond. According to the Joint Chiefs, there were several days in which Iraq could have once again taken Kuwait and made a run at the Saudi oil fields. This has only reinforced the notion among our likely adversaries that they can accomplish at least their initial military objectives before we

can stop them. And, since surprise provides the attacking side such enormous military leverage, we must assume that any future U.S. adversary is likely to do everything possible to mount "a bolt from the blue" attack. History shows that no matter how much you spend on intelligence, you will still be vulnerable. We must reflect on and learn from Pearl Harbor, Korea and the Gulf War.

Given that surprise must be regarded as inevitable, hedging against surprise should've played a key role in the BUR and the Heavy Bomber Study. Clearly, it did not. In both studies, the highest premium should have been placed on forces, such as the B-2, that can respond rapidly, independently and decisively to fast-breaking crises. The rosy assumptions about warning, however, obscured the value of rapid response—and thus the vital contribution of the B-2.

Future adversaries will be armed with weapons of mass destruction and the means to deliver them. The Pentagon's 1994/5 "NIMBLE DANCER" wargame—which employed the assumptions of the Defense Planning Guidance—assumed a Gulf enemy who used neither nuclear nor biological weapons and made only limited use of chemical weapons. NIMBLE DANCER, it seems, also assumed that the potential use of such weapons would have no effect on our military decision-making; our plans to deploy hundreds of thousands of Americans within range of these weapons as quickly as possible. These same assumptions underpinned the Heavy Bomber Study. Put simply, these assumptions fly in the face of common sense—and my Gulf War experience.

Iraq's potential use of nuclear, chemical or biological weapons dominated our thinking while planning the Gulf War air campaign. The potential for chemical warheads on Scud missiles raised the specter of massive casualties in Saudi Arabia, Israel and Bahrain. Although in 1990 we were reasonably confident Saddam had not developed a nuclear bomb, we were far from certain that he wouldn't use nuclear waste material to create a poisonous warhead for his missiles and planes to deliver. Our air defenses could have stopped his planes, but our missile defenses could not have prevented him from scattering radioactive material on our cities and bases in the Arabian theater. Likewise, it wasn't clear how he planned to use his stores of anthrax and botulism germs. We were even unsure as to the effects of our own attacks designed to destroy these deadly materials before they could be used by the Iraqis on our troops and allies.

We therefore set out to counter these new and hostile threats on a broad front, including air attacks on known production, storage and deployed weapons facilities. Our strongest defense was in providing the soldiers and civilians who might be exposed to these weapons of horror the best protective suits and masks available. In fact, after the war, it was reported that our perceived ability to survive chemical attacks led Saddam to decide against launching them. Apparently, he thought chemical attacks would kill more Iraqis than allies. A lot of people take what I believe is false comfort in the notion our nuclear arsenal deterred Saddam from unleashing his WMD. Personally, I don't think our nuclear deterrent was ever truly tested. Would Saddam have kept his WMD holstered if we'd have marched on Baghdad, thus threatening his very existence? Would Hussein have utilized his WMD and missile arsenals differently if he had expected the U.S. to intervene? Might he have even deferred his invasion of Kuwait until after he had developed his first nuclear weapon? In my view, the Gulf War raised many more questions about the post-Cold War viability of our nuclear deterrent than it answered

In reality, other than our preemptive air strikes and passive defense measures, we had few options to counter Iraq's inventory of terror. Should we refocus our air attacks to raze Baghdad? Accelerate the launch of a ground offensive? Escalate to nuclear weapons ourselves? For obvious reasons, none of these options were terribly attractive. In the end, Saddam kept his WMD on the shelf. But what about next time? A former Indian Army Chief of Staff said after the Gulf War that the "lesson of Desert Storm is don't mess with the United States without nuclear weapons." If you believe intelligence reports, it seems that most of our potential adversaries—be they state sponsored terrorists or "rogue" states themselves—are taking this lesson to heart.

The implications are profound. The simple threat of nuclear, chemical or biological use could deter the United States from taking decisive, timely action in a future crisis. Actual WMD use would be devastating. Similarly, countries feeling threatened by a WMD-armed U.S. adversary might balk at providing us access to their bases, ports and territorial waters. Nuclear, chemical or biological strikes against an airbase, port, ship or ground force during deployment or combat could cause massive casualties and bring U.S. operations to a virtual standstill. Events could easily escalate beyond our control. And, the threat is not limited to wartime. Secretary Perry told us in July that the Pentagon expects terrorists to turn to WMD before too long.

Marine Gen. Joseph Hoar, Gen. Schwarzkopf's successor at CENTCOM, has said that the presence of any significant WMD in CENTCOM's area of responsibility (AOR) would require us to fundamentally rethink our ground and air component and the concept of operations that drives both of them. I could not agree more. The proliferation of WMD and ballistic missiles means that our current strategy of pouring thousands of fighters and hundreds of thousands of troops into our enemy's backyard is no longer viable. The best hedge against the emerging WMD threat is to shift as much of the power projection burden as we can—as fast as we can—to long-range systems capable of fighting effectively from beyond WMD range. This should have been a core finding of the BUR, which would have led to an increased emphasis on the bomber force—especially the B-2—and thus obviated the need for a Heavy Bomber Study.

At a minimum, an adequately-sized B-2 fleet would dramatically enhance U.S. counterforce capabilities. As one analyst noted, it would allow us to *credibly* threaten the destruction aggressor WMD programs worldwide—and thus put the rogues and terrorists of the world on notice that WMD development is hazardous to their health. We'll continue to face some technical challenges in the counterforce area, such as those associated with intelligence-gathering and hard-target penetration, hampering operational effectiveness, but "effectiveness" here is a relative concept. In the eyes of a potential adversary, the damage potential of a beefed-up and largely invulnerable long-range strike force is likely to discourage WMD development and/or acquisition. In conflicts with WMD-armed adversaries, such a capability would allow the U.S. to conduct relatively risk-free counterforce strikes prior to large-scale, and otherwise highly vulnerable, theater force deployments. Absent the immediate threat of theater WMD retaliation, long-range counterforce operations could be protracted, allowing the U.S. to sustain strikes until it is deemed "safe" to enter the theater.

The revolutionary combination of stealth and precision must be exploited. Desert Storm marked the first large-scale employment of stealth aircraft—the F-117—equipped with precision weapons. And while we've still not fully grasped the implications of this unprecedented combination, we do know one thing: it has

revolutionized warfare. The F-117 allowed us to do things we could have only dreamed about in the past. It's stealthiness enabled us to gain surprise each and every night of the war, attack any target we wanted, and leverage the capabilities of other assets. The F-117s delivered the first strikes of the war against Baghdad, destroying a wide array of critical targets and paralyzing the Iraqi air defense network. Their attacks on the radar sites and C³ bunkers that controlled the Iraqi defenses opened the door for wave after wave of non-stealthy aircraft to strike effectively and, most importantly, safely. And its ability to paralyze the Iraqi air defense network in the opening minutes of the war was critical to our achievement of air superiority, a vital prerequisite to ejecting the Iraqi army from Kuwait.

But the F-117s did more than just pave the way for less-capable aircraft. They allowed us to strike the "heart" of the enemy—downtown Baghdad—with near impunity, regardless of the defenses. This enabled us to maintain continuous pressure on the most vital targets sets, which dramatically shortened the air campaign. And, because we could depend solely on the F-117 to execute this mission, it more than likely reduced non-stealthy aircraft losses by an order of magnitude.

Stealth also provided tremendous flexibility by drastically reducing the support required for F-117 sorties. For example, if our intelligence detected a heavily-defended target requiring immediate attention, and only conventional aircraft were available, we were faced with a difficult set of choices. We could either forego the strike or pull together an elaborate package of escorts, jammers, defense suppressors and tankers to get our attack aircraft in. This took valuable time and required major planning adjustments. With the F-117, we'd just give them the new target data and let the pilots take care of the rest.

Last year, my chief master attack planner from Desert Storm calculated the "value" of stealth, or the stealth "multiplier effect," in a bomber study for the Commission on Roles and Missions (CORM). He found that, in the first 24 hours of the Gulf War air campaign, each F-117 sortie was "worth" 16 non-stealth sorties. As Iraqi air defenses were whittled down, this ratio leveled off at about 1 to 8, still an extraordinary number. The B-2, equally stealthy to the F-117 but with eight times the payload and five times the range, clearly multiplies even the F-117 "multiplier," raising the prospect of even large-scale air campaigns being prosecuted from outside the theater. Unfortunately, not many people know this, because the CORM chose not to use this data. If they had it would have been difficult if not impossible to avoid recommending additional B-2s.

The need to minimize casualties affects planning, decisionmaking, and operational effectiveness. A fundamental goal as we developed the Gulf War air campaign was the minimization of casualties, both friendly and enemy. Anyone who has led young Americans into combat can appreciate first-hand how this obligation weighs on your mind. All of us, from Schwarzkopf on down, wrestled with the fear that our mistakes would result in the otherwise preventable loss of life. I would visit our air bases, look at the faces of the aircrews, and wonder which ones would not be going home. Both the specter of pitiful Iraqi soldiers abandoned for dead by their commanders and the knowledge that innocent women and children suffered from our bombs still haunts me to this day.

In the end, given the size and scope of the war, we and the enemy endured remarkably few casualties. In planning and executing the air campaign, we emphasized tactics and systems that minimized aircraft losses, even though it limited to some degree the effectiveness of our air attacks. For example, we operated our

aircraft at high altitudes, above the reach of most Iraqi air defenses. This increased aircraft survivability, but it also made target acquisition more difficult and reduced bombing accuracy. Casualty concerns also dictated which assets went "downtown." Despite the large number of critical targets in Baghdad, only the F-117 stealth fighter and the Tomahawk cruise missile were used to attack the heavily-defended Iraqi capital, limiting the damage we could inflict.

We gave casualty avoidance priority over military effectiveness because it was the morally correct thing to do. The American people have demonstrated unbelievable tolerance at the losses of their sons and daughters on the battlefield -- when they believe in the cause. But no President or general can underestimate how quickly such patience will disappear if they are perceived to be spending lives foolishly. Public sensitivity to casualties can dominate our political and military decisionmaking during crisis and conflict. Reflect on Korea and Vietnam and the correlation between rising casualties and growing opposition to U. S. involvement. Reflect on the political impact of our losses suffered in Lebanon and Somalia. Also recall the growing concern for the lives of our soldiers as we began deploying forces to Bosnia.

Without a doubt, the rising public sensitivity to casualties has increased the attractiveness of air power as the military means to accomplish foreign policy objectives. Simply put, the use of air power exposes fewer lives to enemy fire than does the employment of ground forces. Still, we can do much better. Long-range air power leaves far fewer aircrew and support personnel within the enemy's reach than do either or land- or sea-based fighter forces. Stealth technology drastically reduces the chances of our aircraft being shot down. The B-2 is the only aircraft in history to combine stealth with range. This alone is reason enough to expand the fleet. We owe this much to the future war-fighter.

Thoughts on the Recent Iraqi Crisis

When Saddam Hussein ignored our warnings recently and sent three Republican Guard divisions into Irbil, located in the U.S.-protected "no-fly" zone in northern Iraq, most, including myself, believed that a strong military response was in order. Anything less would embolden Saddam and thus increase the likelihood of future aggression.

Now, I'm not privy to any of the military planning or political decisionmaking that led up to our September 3 response, but I can give you a commander's perspective on what I expected it to look like. The objectives seemed fairly clear-cut: halt, if possible, the attacks on the Kurds, but definitely hit Saddam where it would hurt. "Hurting" a dictator like Saddam means attacking what gives him his hold on power—his military. Presumably, top priority would be given to the Republican Guard forces arrayed on the outskirts of Irbil, and to high-value (and thus well-defended) military targets in and around Baghdad. Ideally, F-16s and F-15Es operating out of Turkey and Jordan would attack the Iraqi ground forces, while F-117s from Saudi Arabia would go against Baghdad.

These options never materialized. Soon after the Iraqi invasion, Turkey, Jordan and Saudi Arabia signaled that U.S. airstrikes could not be launched from bases in their territory. This effectively prevented us from using our land-based fighters and forced us to turn to our independent options: carrier airpower, bombers, and cruise missiles. However, this also raised a set of constraints that, fortunately, I never had to deal with as Coalition air commander. Republican Guard forces in the north were beyond the reach of carrier airpower, and, with a goal of no losses in aircraft, sending non-stealthy

Navy strike planes into Baghdad was far too risky. The B-1B and B-52 bombers had sufficient range, but they currently lack required precision munitions options and would have been vulnerable to Iraqi air defenses; to my knowledge, the precision-capable B-2 had not been integrated into CENTCOM war plans. Cruise missiles, meanwhile, require preprogramming, so they could not be targeted against the highly mobile Iraqi forces, and they currently lack the punch required to destroy the hardened facilities inside Baghdad. Sorely missing was that which propelled us to swift victory in Desert Storm—the capability to safely penetrate Iraqi air defenses and deliver large, powerful precision weapons.

Their strike options limited, it appears that our planners turned their attention to a strategy that supported extension of the southern no-fly zone. This meant that attacks against fixed, above-ground facilities in sparsely-populated southern Iraq were the logical choice because of their vulnerability to cruise missiles. Hence the rather limited cruise missile attack against air defenses in southern Iraq, as opposed to the Iraqi forces south of Irbil or targets in Baghdad.

I'm not here to question U.S. policy. I understand as well as anyone the constraints our planners faced, and I know that the situation inside Iraq is very complex. What these events do demonstrate is that our military options are limited and that other important options would be available if our inventory included an adequate number of long-range stealth bombers. In the aftermath of a response to Iraqi aggression that many are calling "soft," we find ourselves in a difficult situation. Having raised the stakes, U.S. credibility is now on the line, and we must be prepared to escalate the violence considerably. Unfortunately, the military forces available for doing so may be inadequate.

The U.S. response to the Iraqi invasion of Irbil was initially applauded as swift and powerful. Upon closer scrutiny, however, it seems clear that major deficiencies in our force posture drove the Clinton Administration to scale back its military objectives. The following points summarize these deficiencies and what we can do to redress them:

- *U.S. global response capabilities are still inadequate.* The origins of the Irbil attack are most likely found in the October 1994 Iraqi feint against Kuwait, where Saddam massed forces against Kuwait and then pulled back when U.S. forces began to arrive. Saddam knew from these exercises that we could not deploy our short-ranged forces fast enough to stop him from accomplishing his Irbil objectives. Post-Gulf War efforts to shorten deployment times, such as the prepositioning of key equipment and the Air Force's creation of Air Expeditionary Forces (AEFs), are laudable, but may amount to "tinkering at the margins." If the United States wishes to deter the Saddam Husseins of the world, we must demonstrate the capability to stop them *before* they can reach their military objectives. This "prompt denial" capability requires one of two things: (a) large numbers of forward-based forces, or (b) forces so rapidly-deployable as to be "virtually" present abroad. Given U.S. budget constraints and foreign political sensitivities, the first option is probably not feasible. The second option certainly is, but will require shifting the power projection burden from slower-deploying short-range ground, sea and air forces to independently-deployable long-range airpower.
- *U.S. forces are far too dependent upon foreign basing.* Current U.S. warfighting strategy hinges on the deployment of short-range fighters and ground forces to foreign bases in the theater of conflict. Desert Storm and the postwar inspections of Iraq's WMD programs underscored the grave risks entailed with such a strategy.

The 1996 Iraqi crisis demonstrated that foreign base access can not be taken for granted. Once Jordan, Saudi Arabia and Turkey opted out, the entire land-based fighter force—the back-bone of American airpower—was effectively neutralized, leaving U.S. military capabilities seriously circumscribed. Carrier airpower, while used in a supporting role (F-14Ds from the carrier *USS Carl Vinson* escorted the cruise missile-carrying B-52s), was unable to compensate. We clearly need the capability to fight effectively from beyond the theater. Again, this requires shifting much of the burden to long-range airpower.

- *Cruise missiles are no panacea.* Cruise missiles are attractive to U.S. decision-makers—and military commanders, for that matter—because they minimize the risk of casualties. Many, in fact, argue that cruise missiles obviate the need for a stealthy bomber. However, as Don Rice, Secretary of the Air Force during Desert Storm, has pointed out, “this argument fails when considering cost and operational effectiveness.” For one, they are much too expensive for sustained operations. Cost of the missiles was the reason Washington gave when they ordered me to stop firing Tomahawks during the Gulf War. The 44 cruise missiles fired at Iraq cost over \$100 million—*over 100 times more expensive* than an equivalent number of precision direct-attack weapons delivered by B-2s. Perhaps more importantly, current-generation cruise missiles are not effective against mobile or heavily-hardened targets. If the United States finds it necessary to truly influence a future Saddam-initiated crisis, planners will have to target hardened and deeply-buried facilities inside Baghdad and the highly-mobile Republican Guard—and convince the national command authority of a high probability that no one will get shot down. This demands stealth aircraft and direct-attack precision weapons. Period.

In my mind, our response to this latest Iraq aggression was a clear case of force structure limitations—mainly range, survivability, and lethality—determining U.S. foreign policy. Given that our current force modernization plans will do little to alleviate these problems, this is as sure a sign as any that the “plan” needs revisiting. The sad fact is that if we’d incorporated the true lessons of Desert Storm into the Bottom-Up Review in the first place, such a large-scale reassessment wouldn’t be necessary.

Conclusion

In 1991, the Gulf War gave me a glimpse into the future of warfare. I saw adversaries who attacked without warning. I saw enemies armed with weapons of mass destruction and ballistic missiles. And I saw an American public who nevertheless expected our wars to be swiftly-won and relatively casualty-free. In 1996, I see the same things, but my confidence that we can overcome these challenges has faded considerably. The difference? In 1991, I returned from the Gulf convinced that tomorrow’s air commanders required, and would indeed have, a fleet of sixty or more long-range, stealthy bombers at their disposal. Inexplicably, the B-2 fleet was slashed from 75 to 20 the following year, completely undermining our ability to employ a newly-relevant—and thus absolutely required—strategy.

The B-2 bomber is the *only* weapon system in the U.S. inventory free of the range, survivability and lethality limitations which plagued us during the recent Iraqi crisis and which will continue to do so. As such, B-2s could well be our only practical option for projecting truly decisive power in future regional crises. Yet, the planned force is simply far too small to underwrite a large-scale air campaign. Given the B-

2's obvious and unique utility in the new strategic environment, it is difficult to comprehend how the Pentagon could so actively resist expanding the fleet.

Certainly, the Air Force is faced with very difficult decisions given the post Cold War budget. And there is no doubt the Army and Navy see the B-2 as an Air Force program that will use resources they feel should be applied to their own acquisition needs. Therefore, rare leadership is needed to build on the revolutionary lessons from Desert Storm and to articulate the solutions to constraints illuminated by recent events in Iraq. We must not continue to commit our scarce procurement resources to less-capable and increasingly obsolescent systems. Our military options require stealthy long range heavy bombardment aircraft. We must provide our war-fighters an adequate force of these systems. If we fail to do so, commanders in the future will be faced with the terrible proposition of having to spend an otherwise needless amount of American lives to accomplish their assigned tasks.

General Charles A. "Chuck" Horner, USAF (Ret.)

General Horner retired from the U.S. Air Force in 1994 as commander in chief of North American Aerospace Defense Command and the United States Space Command, and commander of Air Force Space Command. Prior to that assignment, he was the commander of all U.S. and Allied air assets during Desert Shield and Desert Storm.

General Horner earned a bachelor of arts degree from the University of Iowa in 1958 and a master's degree in business administration from the College of William and Mary in 1972. The general completed Squadron Officer School in 1967, Armed Forces Staff College in 1972, Industrial College of the Armed Forces in 1974 and National War College in 1976.

General Horner is a command pilot with more than 5,300 flying hours. While on active duty he maintained proficiency in a variety of modern fighter aircraft. During the Vietnam War he flew a total of 111 combat missions in the F-105 over North Vietnam.

Following retirement from the U.S. Air Force, General Horner has maintained a close association with national security interests and provides advice to a number of defense related organizations and associations.

Mr. HUNTER. Thank you, General Horner.
Mr. Lawler.

**STATEMENT OF WILLIAM H. LAWLER, VICE PRESIDENT AND
DEPUTY GENERAL MANAGER, MILITARY AIRCRAFT SYS-
TEMS DIVISION, NORTHROP GRUMMAN CORP.**

Mr. LAWLER. Thank you, Mr. Chairman. I'd like to give you a status report on where the B-2 program is today. I'm happy to report to you that the B-2 program is in very good shape.

We're on track to complete the flight tests and deliver the first block 30 airplane to Whiteman Air Force Base by the summer of 1997. We'll complete the 21st block 30 aircraft during the year 2000, within the current budget and schedule that we have on our plans right now.

And notwithstanding the past controversies that have surrounded the B-2 program, we're now delivering aircraft to the 509th Bomb Wing at Whiteman Air Force Base that have outstanding quality. They're ahead of schedule, and we're projecting that we will finish this program within the target cost.

Earlier this year, we provided to the Air Force the near-precision GATS/GAM weapons and they're now at Whiteman Air Force Base available to use on the block 20 aircraft that are currently stationed at Whiteman.

However, the men and women who accomplished these milestones, the B-2 industrial team members, the work force, is at a critical juncture this year. The window of opportunity to produce additional B-2's is rapidly closing. With this highly skilled and motivated work force available now, we must act quickly if we are to build more of these truly revolutionary aircraft at a reasonable cost and schedule.

Mr. Chairman, I have more extensive remarks that I'd like to enter into the record, and at the appropriate time I'd be glad to answer any questions you might have about the B-2 and the program today.

[The prepared statement of Mr. Lawler follows:]

Good afternoon. My name is Bill Lawler, and I am currently the Deputy General Manager for the Military Aircraft Systems Division of Northrop Grumman. I began my engineering career in 1962 at Boeing Aircraft after earning my engineering degree from the University of Alabama. I joined Northrop in 1985--I now have over 10 years of experience on the B-2 program in a variety of executive and senior executive capacities, including Chief Engineer and B-2 Program Manager. It is a great pleasure to testify before you on the history and status of this revolutionary weapon system.

In 1977, around the same time the B-1A was being canceled, the Department of Defense (DoD) initiated research and development for an entirely new class of weapon: a stealthy, penetrating strategic bomber. The existence of a new bomber program was announced by Secretary of Defense Harold Brown in 1980. In October of 1981, the Air Force selected Northrop Corporation as the winner of the competition to be the prime contractor for the new Advanced Technology Bomber (ATB). That same month, President Reagan announced a two-bomber strategy, involving immediate production of 100 B-1B bombers, to be followed by 132 ATBs (the initial designation of the B-2).

Congress has closely monitored the B-2 program from its inception. The four major defense committees of the House and Senate began direct oversight of the B-2 in November of 1981. Between 1981 and 1988, approximately 150 members of Congress made more than 350 visits to Northrop B-2 facilities. Basic information about the program was provided in Congressional testimony by the Air Force and DoD. On November 10, 1981, Dr. Richard DeLauer testified to a subcommittee of the Senate Armed Services Committee that the cost of the 132 aircraft program would be \$35.6 billion in FY81 dollars or \$58.5 billion in FY97 dollars. This testimony was published in the Congressional Record and was available to the general public. The existence of this program, its size, and its projected cost were public information scarcely a month after contract award.

The goal of the B-2 design was to produce an airplane that would meet all the normal requirements of a heavy bomber, including range, payload, mission flexibility, and high readiness and availability rates, while at the same time having a low enough radar-cross-section (RCS) and other signature attributes to penetrate the most sophisticated foreseeable air defenses and deliver with near impunity either nuclear or conventional weapons into the 21st century. This bears repeating. *From the beginning, the B-2 was envisioned as a conventional bomber.* In 1981, design specifications were made for the B-2 based on a conservative intelligence estimate of what Soviet defenses would be like a decade and more in the future.

Since the principal sensor used in air defense is radar, a low RCS was central to the success of the B-2 design. But to prevent an enemy from

detecting the B-2's approach by solely passive means, it was also necessary to control infra-red (heat) emissions, electronic emissions (particularly the emissions of the B-2's own radar), and visual signature. The design philosophy was to balance all aspects of the B-2's signatures, such that no current or projected sensor could detect the aircraft at a significantly greater range than any other sensor.

Almost immediately, the program began to endure numerous customer-directed programmatic changes. One of the most dramatic was a major change in basic configuration to accommodate low altitude penetration. The B-2 was originally designed for high-altitude penetration. In 1983, with much of the design work already complete, the Air Force initiated a redesign of the wing, necessitated by the service's perception that the B-2 must become equally well-suited for very low-altitude flight. Changes cascaded throughout the design, including a forward movement of the cockpit, trailing edge planform modifications to redistribute wing loads, and the addition of inboard elevon control surfaces. A host of less dramatic changes were ordered, increasing cost directly, as well as indirectly through program delay. Other changes became unavoidable as various technical problems were discovered and solved, with comparable effects on cost and schedule.

However, steady progress was being made on the aircraft. In November of 1988, B-2 Air Vehicle (AV) #1 was rolled out of its hangar in Palmdale, California, and was publicly displayed for the first time. The B-2 made its first flight in July of 1989, going from Palmdale to Edwards Air Force Base, California. But as the cost of the B-2 crept up and annual funding requirements increased as the plane proceeded toward production, political resistance to the aircraft escalated. Numerous attempts were made to cut or slow the program, reaching a milestone in 1989 when amendments were attempted in both the House and the Senate to halt the program at less than 20 aircraft (i.e., the number funded through that time). With dramatic change taking place in Eastern Europe, declining defense budgets, and eroding political support, then-Secretary of Defense Cheney announced a one-year delay in the B-2 program so that he could review the aircraft's status. House and Senate budget conferees cut the administration's 1990 B-2 funding request by almost a billion dollars.

In April of 1990, Secretary Cheney announced the results of the DoD's Major Aircraft Review. As part of a larger budget reduction effort, the B-2 program was cut from 132 to 75 aircraft. This had severe effects on the program: the funding required for research and development is basically independent of the number of planes produced. Now the total cost of R&D had to be spread over fewer planes, making it appear as though the bomber had suddenly increased in cost. In addition, numerous economies-of-scale were lost, resulting in real increases to average unit cost of production.

Shortly thereafter, the Soviet Union collapsed, further eroding support for the B-2 and for the defense budget. And in July of 1991, B-2 flight test of RCS

revealed an "anomaly" in "one area"--meaning that the plane failed to meet a signature specification established in 1981. The combination of these and other events generated additional political resistance and, in January of 1992, President George Bush announced in his State of the Union Address that the B-2 program would be limited to 20 operational aircraft.

Since that time the B-2 has repeatedly demonstrated its merit as an aircraft and as a program. In August of 1992, then-Secretary of the Air Force Donald Rice announced that problems with the B-2's radar cross section discovered in July of 1991 had been solved. Other small development issues identified during flight test have been or are being resolved and overall program performance, in my opinion, has been excellent, as reflected in current program status. On October 14, 1993, then-Secretary of Defense Les Aspin formally certified to Congress that flight test had proven the B-2's operational performance in all major areas, including detection and survivability, air vehicle performance, and offensive and defensive avionics.

The goal of the B-2 industry team is to deliver 21 fully operational B-2 bombers to Whiteman Air Force Base, Missouri, with the recent agreement to update the last B-2 test aircraft to operational status. To date, we have produced 19 aircraft. The first six aircraft were configured for flight test (and will subsequently be upgraded to operational configuration); the other 13 have been delivered to Whiteman. The B-2s are being delivered in a three block-phased approach; each of the blocks have increasing levels of capability. For example, Block 10 aircraft have six radar modes; Block 20 aircraft have 11 radar modes, terrain following capability, and can deliver near-precision weapons; and Block 30 aircraft will have 19 radar modes along with signature and other numerous capability enhancements.

We delivered the last Block 10 aircraft in January of this year; we recently delivered the fourth Block 20 aircraft. The latter have the important capability to deliver near-precision GPS-Aided Munitions (or GAMs) with accuracies of less than 20 feet. Combining stealth, near-precision, range, and payload, these aircraft offer a revolutionary way to project power. Currently at Whiteman, the Air Force possesses four Block 10 aircraft and five Block 20 jets (the balance being in upgrade, test, or maintenance). We plan to bring more of the Block 10 aircraft up to Block 20 configuration and deliver them to Whiteman so that there is a full eight aircraft squadron of these jets by the first half of 1997. I'm pleased to report that we have been delivering aircraft early on a consistent basis over the past year, which is no small feat given the complexity of this aircraft and the need to meet stringent signature requirements.

By summer of next year, we are scheduled to deliver the first Block 30 aircraft. This B-2 will meet final low observable signature requirements in addition to enhanced capabilities in other areas. Block 30 B-2s will be, quite simply, the most lethal and survivable combat aircraft in history.

I'm also pleased to report that the B-2 has demonstrated outstanding reliability and maintainability while in service at Whiteman. During the design of the B-2, we employed an integrated logistics testing philosophy and paid a great deal of attention to reliability and maintainability. Ninety percent of all B-2 maintenance can be completed without opening any access panels. For example, the radar can be accessed through the nose gear well for most maintenance. The results at Whiteman seem to indicate that this careful design and engineering work is paying off. Even though the B-2 is in the early stages of its service career, its system reliability is currently yielding mission availability rates of 90% (which I believe is unprecedented for an aircraft of this complexity, an aircraft with more lines of software code than the space shuttle). By another measure -- logistics reliability--its performance is already twice as good as other current bombers. This is important to note, considering the significant impact a systems' reliability and maintainability can have on its long-term ownership costs.

The Air Force's growing confidence in the aircraft is reflected in the changed phase inspection schedule. Aircraft phase inspection intervals have grown from 200 to 400 hours; with a goal of every 600 hours. Air Force confidence in the system can also be seen in the long-range power projection missions B-2 aircraft have flown in the past year. For example, B-2s have flown to Singapore, Paris, London, and South America. The latter flight involved a 25-hour mission. The Air Force has also flown the B-2 in its annual Red Flag war exercises - one to two years ahead of schedule. These are certainly not the sort of missions the Air Force would conduct if it had concerns about B-2 reliability.

The exhaustive flight test program will be completed in the July of 1997. We have flown over 4,000 hours on the test aircraft, some of which are already being converted to Block 30 configuration. In the test program, we have demonstrated the aircraft's ability to meet range and payload specifications. We have completed cold weather testing successfully. We have demonstrated the delivery of a wide range of nuclear and conventional weapons. We recently went to 200-foot terrain following/terrain avoidance (TF/TA) flights, demonstrating the maturity of the radar and aircraft to reliably perform this demanding mission. We are currently calibrating the radar to perform TF/TA in the rain and will complete this challenging task by April next year. In short, we are well positioned to complete the test program as scheduled with the exception of some aspects of mission effectiveness testing, which will be conducted using operational aircraft.

I think overall the program is in very good shape; we are on track to complete the delivery of the 20th Block 30 aircraft in the year 2000 on schedule within the established program budget. The 21st aircraft, which was ordered by President Clinton this spring, is in the process of contract definitization and should also be delivered in 2000. Equally important is the fact that we're also on track to come in *under* the targeted total program cost of \$44.4 billion.

There are three final points I'd like to address:

First, the wide range of design, engineering, and production challenges posed by this program are, to my knowledge, unprecedented. Quite literally, members of the B-2 design and production team had to invent new materials and new processes on a weekly and sometimes daily basis. We have production standards and requirements that are head and shoulders above anything you will find on any other aircraft anywhere in the world. To meet these standards we have had to train a production workforce from the ground up. We could not hire trained workers because no one had developed the needed skills to implement over 1000 new technologies and processes. These development challenges did result in slipped delivery schedules and quality problems in the early phases. So we worked even harder at improving our performance. Now we're delivering aircraft *ahead* of schedule with outstanding quality.

Second, I'd like to highlight the GPS-Aided Targeting System (the GATS) and the GPS-Aided Munition (or GATS/GAM), which together give the B-2 a near-precision capability. In essence, the crew can use the radar to take a snapshot of the target and then individually select aimpoints for 16 one-ton weapons with near-precision accuracy. And, unlike the laser-guided weapons typically delivered by fighters, the GAM can be delivered through cloud cover and in adverse weather. With GATS/GAM, the B-2 can independently target sixteen separate aimpoints on a single pass. Air Force Chief of Staff Ronald Fogleman said recently that, because of this revolutionary development, Air Combat Command is now in the process of rethinking the application of force. "We are beginning to change our thinking," he said, "from how many aircraft it takes to destroy one target, to how many targets we can destroy with one aircraft."

Without the introduction of GAM, this near-precision capability would not have been available to the operator for several years under original plans. Early availability of this system was made possible by several factors: My company was willing to invest resources to make sure the aircraft would be deployed with near-precision weapons. Moreover, the Air Force agreed to employ a streamlined acquisition process that allowed us to go from paper proposal to hardware delivery in less than 30 months.

And third, the B-2 is the product of a nation-wide industrial team that at its peak represented over 12,000 companies, in 48 states, involving approximately 40,000 men and women. I would like to make sure you understand just how close we are to dissolving this team. All major assemblies of the B-2 have been completed, and production lines at our major subcontractors have been shut down. The majority of our suppliers and vendors have completed final work and have been "closed out" of the program. We have reduced to a sustaining force at our major subcontractors, Boeing, Hughes and Lockheed Martin. The vast majority of people who used to work on the B-2 have since gone out to other work. Most

of the remaining workers are at Northrop Grumman's facilities in Pico Rivera and Palmdale, and even there the workforce has declined dramatically, dropping from almost 14,000 in 1987 to less than 7,500 today, and headed toward less than 3,000 by the year 2000.

The remaining workers are the heart and soul of the program. When they disperse, the ability to produce B-2s will effectively be lost. If you allow this to happen, just the RDT&E costs for the next generation bomber will amount to as much as \$45 billion according to formal Pentagon estimates--more than the total current B-2 program cost. If you believe the nation will need more bombers sometime in the next 20 years, then you must act quickly, because the window of opportunity to produce them at a reasonable cost and schedule is rapidly closing.

Finally, I'd just like to say how proud I am of the B-2's performance. I've been in the aerospace industry for over three decades, and this is truly an amazing aircraft--one that all of us on the B-2 Industrial Team are extremely proud of. We have built and delivered an aircraft that can fly intercontinental distances carrying the payload of half a dozen fighters. That same aircraft has a wingspan more than half the length of a football field with the radar signature of an insect. This is truly an amazing technological accomplishment. The B-2 offers a revolutionary combination of stealth, range, payload, and precision. Given the emerging international security environment of reduced forward-based forces, short warning times, and proliferation of weapons of mass destruction, the B-2 appears uniquely suited to protecting U.S. national security objectives around the world in a cost-effective manner.

Mr. HUNTER. Thank you, Mr. Lawler. Just one question before we go to Dr. Payne. When does that window close?

Mr. LAWLER. Well, the cost of the nonrecurring work force reconstitution goes up every year. When we bid, put in an estimate to the Air Force 2 years for building 20 more B-2s, that was estimated at a \$500 million just to reconstitute that.

Three years from that estimate, the bill would be \$1.6 billion. So the problem is that the cost of finding those resources and getting them reconstituted is not a linear thing. It goes up every year.

So there's not a direct answer that it goes away this fall, this winter, but you're talking about if we don't get a commitment within a year or so, it's going to be very difficult to reconstitute that work force.

Mr. HUNTER. Thank you. Dr. Payne.

STATEMENT OF KEITH D. PAYNE, Ph.D, PRESIDENT, NATIONAL INSTITUTE FOR PUBLIC POLICY

Mr. PAYNE. Thank you, Mr. Chairman. It's a pleasure to be here today. I'd like to summarize my prepared statement and ask that the full statement be submitted for the record.

Two recently completed studies are pertinent to the subject of today's hearings, and each of these studies will be published within a few weeks and available publicly. In my statement, I'd like to summarize several of the main findings of these studies, and request that the second of those I summarize, what I'm called the Guthe study, be submitted for the record.

The first study I'd like to review is entitled, "Deterrence in the Second Nuclear Age." It's my own analysis of U.S. deterrence requirements.

Mr. HUNTER. Without objection, the studies that you mentioned will be included in the record.

[The information referred to was submitted for the record:]

Second study referred to: "Deterrence in the Second Nuclear Age" (Lexington, KY: University Press of Kentucky, October 1996) by Dr. Keith D. Payne, president, National Institute for Public Policy.

A Precisely Guided Analytic Bomb:

The Defense Department's Heavy Bomber Force Study

Kurt Guthe

September 1996

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The views expressed in this report are those of the author.
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A Precisely Guided Analytic Bomb: The Defense Department's Heavy Bomber Force Study

At best, any [military model, simulation, or game] provides a single perspective on a problem, one that is highly colored and qualified by the steps taken to create it. These logical distortions are seldom sufficiently heeded.¹

Garry D. Brewer and Martin Shubik, *The War Game: A Critique of Military Problem Solving*

Introduction

Since the end of the Cold War, the size of the B-2 bomber force has been a recurrent issue in defense planning and budget debates. In April 1990, a few months after the Berlin Wall fell, the planned B-2 force was cut from 132 aircraft (the original objective) to 75. This reduction partly was a response to the disintegration of the Soviet bloc and the progress of political reform inside the Soviet Union, which together decreased the number of bombers needed to deter or counter a nuclear attack by Moscow.² It also was a consequence of budget stringency. In January 1992, a few months after the anti-Gorbachev coup failed, the 75-aircraft force was reduced by nearly three-quarters. This decision to acquire no more than 20 B-2s was tied to the breakup of the Soviet Union and the consequent degradation of the air defense system the radar-evading B-2 was designed to overcome. The continuing decline in defense spending was another reason for the change.³ In September 1994, with deep negotiated cuts in nuclear arms in prospect, a Department of Defense (DoD) review of nuclear policy and capabilities concluded that the U.S. deterrent to nuclear attack, notably a first strike by a hostile Russia, would not require a B-2 force larger than 20 aircraft. (The basis for this judgment

1. Garry D. Brewer and Martin Shubik, *The War Game: A Critique of Military Problem Solving* (Cambridge, MA: Harvard University Press, 1979), p. 153.

2. Secretary of Defense Dick Cheney, in Senate Armed Services Committee, Hearings, *Department of Defense Authorization for Appropriations for Fiscal Year 1991, Part 1*, 101st Cong., 2d sess. (Washington, DC: GPO, 1990), pp. 790, 808, 813-814, 819, 832, 833; Cheney, in House Armed Services Committee, Hearings, *National Defense Authorization Act for Fiscal Year 1991*, HASC No. 101-45, 101st Cong. 2d sess. (Washington, DC: GPO, 1991), pp. 723-724, 746.

3. President George Bush, Address Before a Joint Session of the Congress on the State of the Union, January 28, 1992, in *Public Papers of the Presidents of the United States: George Bush, 1992-1993, Book 1* (Washington, DC: GPO, 1993), p. 158; Office of the White House Press Secretary, Fact Sheet, in *US Department of State Dispatch*, Vol. 3, No. 5 (February 3, 1992), pp. 74, 75; Cheney, in Senate Appropriations Committee, Hearings, *Department of Defense Appropriations for Fiscal Year 1993, Part 3*, 102d Cong., 2d sess. (Washington, DC: GPO, 1992), pp. 951, 960, 963; Cheney, in House Armed Services Committee, Hearings, *National Defense Authorization Act for Fiscal Year 1993*, HASC No. 102-41, 102d Cong., 2d sess. (Washington, DC: GPO, 1992), pp. 167-168.

was not made public.)⁴ Thus, in the course of past debates, the present size of the B-2 force was determined primarily with regard to the tightening defense budget and the diminishing Soviet/Russian nuclear threat, and not the military requirements of other contingencies.

But in this same period, the aftermath of the global rivalry in which the United States risked nuclear war with the Soviet Union, there also has been growing attention to the nonnuclear capabilities of "heavy" bombers (that is, B-2s, B-1Bs, and B-52Hs) for winning regional wars with other adversaries. In particular, many now believe that heavy bombers, in sufficient numbers and loaded with suitable conventional weapons, could have considerable value in defeating a sudden ground offensive against an ally in a distant theater in which few U.S. forces routinely were deployed.⁵ The aforementioned circumstances and logic under which the planned B-2 force dropped to 20 aircraft are largely irrelevant to sizing a force for use in regional conflicts. At issue today is not how much smaller the B-2 force can be made before the nuclear deterrent is weakened, but how many more B-2s, if any, are necessary for future conventional wars.

Members of Congress have been among those most interested in the nonnuclear applications of heavy bombers and their implications for the size of the bomber force, its composition, and the possible need for additional B-2s. In the summer of 1994, reports by the Senate Armed Services and Appropriations Committees on defense budget legislation for fiscal year (FY) 1995 expressed dissatisfaction with the post-Cold War bomber plan pursued by DoD.⁶ A number of criticisms were aimed at the plan. For example, the rationale for recent cutbacks in the bomber force was lacking. A significant gap existed between the number of bombers required by national military strategy and the number actually available for combat, a deficit identified in analyses done by both the Defense Department and outside research organizations. Programs to upgrade bombers (with precision-guided weapons, for example) were underfunded. At the same time, the bomber production base was withering as the last B-2s were being assembled. "Unanswered questions" about the future bomber force, the Appropriations report said, "left many in Congress with an uneasy feeling."

4. Secretary of Defense William J. Perry, *Annual Defense Department Report to the President and the Congress* (Washington, DC: GPO, February 1995), pp. 83-91, esp. p. 87 (hereinafter *DoD Report for 1995*); Deputy Secretary of Defense John M. Deutch, in Senate Armed Services Committee, Hearings, *Briefing on Results of the Nuclear Posture Review*, 103d Cong., 2d sess. (Washington, DC: GPO, 1994), pp. 13, 14, 20, 21, 27, 36.

5. See, for example, Glenn C. Buchan, "The Use of Long-Range Bombers in a Changing World," in Paul K. Davis, ed., *New Challenges for Defense Planning: Rethinking How Much Is Enough*, MR-400-RC (Santa Monica, CA: RAND Corp., 1994), pp. 393-450; Maj. Gen. Jasper Welch, USAF (Ret.), "Bomber Forces for 'Cold Start' Conflict," *Air Force Magazine*, Vol. 77, No. 12 (December 1994), pp. 30-39; Burdeshaw Associates, Ltd., *Using Prompt Massive B-2 Firepower to Win Quickly, Decisively, and with Few Casualties* (Bethesda, MD: Burdeshaw Associates, January 22, 1992); Senate Armed Services Committee, Report, *National Defense Authorization Act for Fiscal Years 1992 and 1993*, Report 102-113 (Washington, DC: GPO, 1991), p. 66; Rep. Norman Dicks, Remarks at a meeting sponsored by the National Defense University Foundation and the American Defense Preparedness Association, October 10, 1994 (transcript).

6. Senate Armed Services Committee, Report, *National Defense Authorization Act for Fiscal Year 1995*, Report 103-282, 103d Cong., 2d sess. (Washington, DC: GPO, 1994), pp. 54-61 (hereinafter *SASC FY 95 Report*); Senate Appropriations Committee, Report, *Department of Defense Appropriations Bill, 1995*, Report 103-321, 103d Cong., 2d sess. (Washington, DC: GPO, 1994), pp. 186-187 (hereinafter *SAC FY 95 Report*). See also House-Senate Committee of Conference, Report, *Making Appropriations for the Department of Defense for the Fiscal Year Ending September 30, 1995, and for Other Purposes*, House Report 103-747, 103d Cong., 2d sess. (Washington, DC: GPO, 1994), pp. 95-96, 161-162.

To answer these questions and obtain a better basis for dealing with bomber-related issues in the FY 1996 budget cycle, Congress in the fall of 1994 directed the Secretary of Defense to carry out a future-oriented study of bomber force requirements and the cost-effectiveness of alternative bomber mixes (including upgrades and munitions).⁷ DoD assigned the task of performing the study to the Institute for Defense Analyses, a federally funded research and development center. Formal guidance for structuring and conducting the study was issued by the Deputy Secretary of Defense in December 1994.⁸

Results of this analytic effort, called the Heavy Bomber Force Study (HBFS), were briefed to Congress and the press by Paul Kaminski, Under Secretary of Defense for Acquisition and Technology, in May 1995.⁹ The study concluded that the planned force of 66 B-52H, 95 B-1B, and 20 B-2 bombers would be adequate for the hypothetical conventional conflicts current national military strategy has been devised to win. Although the study showed "additional value is provided by more B-2s," other ways of augmenting the capabilities of the bomber force were judged more cost-effective. The preferred alternatives were improved electronic countermeasures equipment and conventional weapons for the B-1B, and larger quantities of accurate guided munitions for both bombers and tactical strike aircraft. Armed with these findings, DoD officials affirmed their decision to buy no more than 20 B-2s.¹⁰

While embraced in the upper reaches of the Defense Department, the HBFS did not prove the final word on the merits of a larger force of B-2s. Its method, suppositions, and conclusions were criticized by, among others, key members of Congress.¹¹ Despite the findings of the study, the House of Representatives on two occasions in the latter half of 1995 rejected, with bipartisan majorities, defense bill amendments intended to prevent

7. Public Law 103-337, Section 133(a), October 5, 1994; Public Law 103-335, Section 6101, September 30, 1994.

8. Memo from John Deutch to Secretaries of the Military Departments, Vice Chairman of the Joint Chiefs of Staff, Under Secretary of Defense (Research and Acquisition), et al., subj: FY 95 Heavy Bomber Force Study, December 1, 1994, reprinted in "Bomber Force Study Limits Procurement Options to B-2," *Inside the Pentagon*, Vol. 11, No. 3 (January 19, 1995), pp. 12-15.

9. Kaminski, Defense Department Special Briefing (briefing slides and Office of the Secretary of Defense/Public Affairs transcript), May 3, 1995 (hereinafter DoD Special Briefing); House Appropriations Committee, Hearings, *Department of Defense Appropriations for 1996*, Part 4, 104th Cong., 1st sess. (Washington, DC: GPO, 1996), pp. 317-408 (hereinafter HAC FY 96, Pt. 4); Senate Armed Services Committee, Hearings, *Department of Defense Authorization for Appropriations for Fiscal Year 1996 and the Future Years Defense Program*, Part 7, 104th Cong., 1st sess. (Washington, DC: GPO, 1996), pp. 343-427 (hereinafter SASCFY 96, Pt. 7).

10. Ibid. See also letter from Gen. John M. Shalikashvili, Chairman of the Joint Chiefs of Staff, to Sen. Carl Levin, June 21, 1995, reprinted in "Letter from Shalikashvili to Senator Levin on More B-2s," *Inside the Air Force*, Vol. 6, No. 27 (July 7, 1995), p. 3; letter from Deputy Secretary of Defense John White to Rep. Ronald Dellums, July 21, 1995, reprinted in "OSD: More B-2s Would Stress Underfunded DOD Budget by \$3 Billion a Year," *Inside the Air Force*, Vol. 6, No. 31 (August 4, 1995), p. 6; White, Address to the Air Force Association Business Session, September 18, 1995 (Office of the Secretary of Defense/Public Affairs transcript), p. 10; Perry, cited in Bradley Graham, "Hill Risks 'Catastrophe' in Funding, Perry Says," *Washington Post*, January 25, 1996, p. A23; Kaminski, DoD News Briefing, February 5, 1996 (Office of the Secretary of Defense/Public Affairs transcript), pp. 5-6, 8; Perry, *Annual Defense Department Report to the President and the Congress* (Washington, DC: GPO, March 1996), p. 175 (hereinafter DoD Report for 1996).

11. Tanya Bielski, "Bomber Study Under Attack in Congress," *Defense Daily*, Vol. 187, No. 34, May 18, 1995, p. 245; John D. Morrocco, "Bomber Debate Sharpens as Panel Adds B-2 Money," *Aviation Week & Space Technology*, Vol. 142, No. 21 (May 22, 1995), pp. 21-23; John A. Tirpak, "The Pentagon Declines More B-2s," *Air Force Magazine*, Vol. 78, No. 7 (July 1995), pp. 13-16.

production of additional B-2s.¹² The FY 1996 defense budget passed by Congress increased B-2 funding by some \$500 million more than the amount requested by DoD.

After Congress appropriated the added funds, President Clinton ordered the National Security Council (NSC) staff to reexamine B-2 "acquisition options."¹³ Upon completion of the brief review in early February 1996, the President and his advisers determined that, for the moment, more bombers were not required and that the additional funding would be spent on improving the planned B-2 force. The President also directed that the Defense Department's ongoing Deep Attack/Weapons Mix Study (DAWMS) include consideration of trade-offs among heavy bombers, tactical strike aircraft, and various missiles.¹⁴ In making these decisions public, an NSC official did not "rule out the possibility that the [DAWMS] could come in and provide an analytical basis for concluding that buying additional B-2s would be more cost-effective than maintaining other assets in the force."¹⁵ The portion of the study directed at finding the most appropriate mix of weapon delivery systems should be completed sometime before mid-1997.¹⁶

In a March 1996 speech, the presumptive Republican presidential nominee, Senator Robert Dole, called for production of more B-2s. He mentioned security problems in Southwest Asia and elsewhere as the justification for a larger force.¹⁷ The day before the speech, the Defense Department, acting on a new decision by the President, announced that the first B-2 flight-test aircraft would be converted to an operational bomber. The funds added to the B-2 program by Congress will be used to upgrade the airframe, weapons bay doors, landing gear, fuel system, and avionics of the test aircraft. With this conversion, the planned force increases to 21 B-2s.¹⁸

12. On June 13, 1995, H.R. 1530 was defeated 203-219, with 146 Republicans and 73 Democrats in the majority; on September 7, 1995, H.R. 2126 was voted down 210-213 by a majority with 147 Republicans and 66 Democrats. See Pat Towell, "House Votes to Sweep Aside Clinton's Priorities," *Congressional Quarterly*, Vol. 53, No. 24 (June 17, 1995), pp. 1735-1737 (vote tally on pp. 1778-1779); Donna Cassata, "House Flouts Clinton Policies on B-2 Production, Abortion," *Congressional Quarterly*, Vol. 53, No. 35 (September 9, 1995), pp. 2728-2729 (vote tally on pp. 2750-2751).

13. Robert Bell, Senior Director for Defense Policy and Arms Control at the National Security Council, Press Briefing, February 8, 1996 (transcript prepared by the Office of the White House Press Secretary).

14. On the DAWMS, see *ibid.*; Deep Attack/Weapons Mix Study terms of reference, reprinted in "JCS Responsible for Determining Definition of Deep Attack," *Inside the Pentagon*, Vol. 6, No. 5 (November 10, 1995), pp. 14-16; DoD Report for 1996, pp. 173-174; Bruce A. Smith, "Block-20 B-2 Test Flown," *Aviation Week & Space Technology*, Vol. 144, No. 8 (February 19, 1996), pp. 54-55; Frank Olivert, "Power Generation Surges as Fleet Sizes Fall," *Defense News*, Vol. 11, No. 9 (March 4-10, 1996), p. 8; Jeff Erlich and Theresa Hitchens, "U.S. Mulls Military Plan Rewrite," *Defense News*, Vol. 11, No. 11 (March 18-24, 1996), p. 4; Douglas Berenson and Pamela Hess, "Senior USAF Official Raps Methodology in Attack Weapons Mix Study," *Inside the Pentagon*, Vol. 12, No. 22 (May 30, 1996), p. 1; "House Panel Directs Independent Oversight for Deep-Strike Trade Study," *Inside the Air Force*, Vol. 7, No. 23 (June 7, 1996), p. 14; Robert Holzer, "U.S. Military Wants Voice in Weapon Assessment," *Defense News*, Vol. 11, No. 22 (June 3-9, 1996), p. 1; Jeff Erlich, "USAF Officials Decry Mission Loss in Pentagon Study," *Defense News*, Vol. 11, No. 26 (July 1-7, 1996), p. 6; Jeff Erlich, "U.S. War Games Put PGMs to the Test," *Defense News*, Vol. 11, No. 31 (August 5-11, 1996), p. 3.

15. Bell, Press Briefing, p. 3.

16. Kaminski and Gen. Joseph W. Ralston, Vice Chairman of the Joint Chiefs of Staff, "The DoD Tactical Aviation Modernization Program," Prepared statement before the House National Security Committee, June 27, 1996 (photocopy), p. 34; "U.S. War Games Put PGMs to the Test."

17. Blaine Harden, "Dole Visits Defense Plant to Urge Larger Fleet of B-2s," *Washington Post*, March 23, 1996, p. A10.

18. "Air Force to Upgrade B-2 Test Flight Aircraft," *Department of Defense News Release No. 146-96*, March 21, 1996.

The ultimate size of the B-2 force thus remains at issue, the conclusions of the HBFS notwithstanding. A substantial number of congressmen and senators, along with presidential candidate Dole, favor a larger force. And there is a possibility the results of the DAWMS will indicate a need for more B-2s. Though the HBFS did not settle the matter, its findings still play a role in the continuing controversy over how many B-2s are enough. Those opposed to a larger force frequently cite the study to support their position.¹⁹ Yet, as with many complex studies, the HBFS too often is used almost as a stage prop rather than an analytic prop, the bottom line invoked while its underpinnings are ignored.

To bring greater clarity to the B-2 debate, this report examines those underpinnings and their influence on the bottom line. The report concludes that the HBFS is so narrow in scope and defective in approach that it fails to recognize the real utility heavy bombers, especially the B-2, will have in the emerging security environment. The deficiencies of the HBFS, in combination, yield an underestimate of the number of B-2s necessary for future conflicts. Because of these deficiencies, the study should not determine a force structure decision that will have a legacy extending well into the 21st century. Ending B-2 production at 21 aircraft on the basis of the HBFS would leave the United States with a small and aging bomber force during an era in which the value of long-range air power almost certainly will grow.

The discussion below is divided into three parts. In the first, key elements of the HBFS are summarized. This orients the reader and outlines what will be critiqued. The second part describes, in the words of the epigraph, the "logical distortions" in the HBFS. These distortions—questionable assumptions, methods, and yardsticks—"color and qualify" the analysis, rendering it a "single (and dubious) perspective" on the problem of planning the future bomber force. In the last part, main points of the critique are recapitulated and some suggestions are offered as to how the DAWMS might avoid the pitfalls of the HBFS.

19. See remarks by Reps. Ronald Dellums, Greg Ganske, and John Kasich, in *Congressional Record—House*, June 13, 1995, pp. H5874, H5875, H5876, H5879, H5880, and Reps. David Obey, Michael Castle, and Rob Portman, in *Congressional Record—House*, September 7, 1995, pp. H8618, H8619, H8620. See also Kasich, "The B-2: Stealth Has Its Limits," *Washington Post*, July 19, 1995, p. A21; letter from Sens. John McCain, Patrick Leahy, William Cohen, and Carl Levin to President Bill Clinton, February 7, 1996; Jeffrey Record, "The Never-Ending Bomber Debate," *Strategic Review*, Vol. 23, No. 4 (Fall 1995), p. 14.

The HBFS in Brief

The report for the HBFS is classified. The précis here draws on the unclassified briefings by Under Secretary Kaminski²⁰ as well as other open sources. Some criticisms of the study may be answered in the more detailed classified report, but that report cannot be considered in this unclassified critique. In any case, Dr. Kaminski has vouched that his briefings give an accurate and adequate summary of the HBFS.²¹

The HBFS has as its foundation the strategic framework of the Bottom-Up Review (BUR). Present defense strategy and force structure objectives were formulated in that 1993 DoD analysis.²² The bomber study includes "all the planning assumptions that the [Defense] Department uses to size the Bottom-Up Review forces and that the Department is currently using in defense planning guidance."²³ Consistent with the BUR framework, the HBFS posits two "nearly simultaneous" major regional conflicts (MRCs) in which U.S. forces come to the aid of endangered allies. The first, called "MRC-West," is triggered by a North Korean invasion of South Korea. The second, "MRC-East," begins with an Iraqi invasion of Kuwait and Saudi Arabia.²⁴ Both invasions are armor-heavy, combined-arms offensives.²⁵ Together they constitute the "two-MRC scenario."

The Korean war breaks out before the Persian Gulf war. (For reasons not made clear, this sequence in the HBFS reverses the order in the BUR.)²⁶ The United States is assumed to have warning of the North Korean attack 14 days before it is launched.²⁷ Although the United States has forces forward-deployed in Northeast Asia (including an Army division, a Navy aircraft carrier battle group, and two-and-a-half Air Force combat wings),²⁸ the bulk of the military power needed to counter the North Korean invasion

20. DoD Special Briefing; HAC FY 96, Pt. 4; SASC FY 96, Pt. 7.

21. HAC FY 96, Pt. 4, pp. 321, 322, 338; SASC FY 96, Pt. 7, p. 347.

22. See Secretary of Defense Les Aspin, *Report on the Bottom-Up Review* (Washington, DC: Department of Defense, October 1993); DoD Report for 1995, pp. 27-32; DoD Report for 1996, pp. 11-15.

23. Kaminski, in HAC FY 96, Pt. 4, p. 339. See also Deutch memo to Secretaries of the Military Departments, et al.

24. The Korean war and the Persian Gulf conflict are identified as "MRC-West" and "MRC-East," respectively, in Rear Adm. Francis W. Lacroix, Deputy Director, J-8, Organization of the Joint Chiefs of Staff, in Senate Armed Services Committee, Hearings, *Department of Defense Authorization for Appropriations for Fiscal Year 1995 and the Future Years Defense Program, Part 1*, 103d Cong., 2d sess. (Washington, DC: GPO, 1994), pp. 698, 748 (hereinafter SASC FY 95, Pt. 1). One of the briefing slides used by Kaminski shows MRC-West starting before MRC-East (HAC FY 96, Pt. 4, p. 363). For a description of the MRCs, see *Report on the Bottom-Up Review*, pp. 13-17, 19.

25. *Report on the Bottom-Up Review*, p. 15. See also *Defense Planning Guidance for Fiscal 1997-2001*, quoted in Tony Capaccio, "Lacking Readiness Dollars, Much of B-2 Fleet Faces Grounding," *Defense Week*, Vol. 16, No. 19 (May 8, 1995), p. 15.

26. HAC FY 96, Pt. 4, p. 363; Lacroix, in SASC FY 95, Pt. 1, p. 751.

27. Reps. Norman Dicks and Jerry Lewis, in HAC FY 96, Pt. 4, pp. 318, 389, 390; Ralph Vartabedian, "Study Likely to Oppose Doubling of B-2 Purchases," *Los Angeles Times*, April 22, 1995, p. D1.

28. Office of the Assistant Secretary of Defense for International Security Affairs (East Asia and Pacific Region), *United States Security Strategy for the East Asia-Pacific Region* (Washington, DC: Department of Defense, February 1995), pp. 24-25; DoD Report for 1995, p. 29; DoD Report for 1996, p. 13.

comes from outside the region.²⁹ DoD planners calculate that winning one MRC, like the postulated Korean conflict, will require five Army divisions, four or five carrier battle groups, 10 fighter-wing equivalents (with 72 aircraft per wing equivalent), one or two Marine Expeditionary Forces, and various other forces, including up to 100 heavy bombers.³⁰ The BUR and HBFS assume these units are deployed with dispatch to in-theater bases and stations at sea. For example, in the HBFS analysis, approximately 800 tactical aircraft and two carrier battle groups are present at the start of hostilities.³¹ Furthermore, the buildup is unimpeded by enemy attack (commando operations, air raids, or missile strikes).

Like the BUR, the HBFS emphasizes the role of bombers in the initial, "halting" phase of the MRC.³² During this stage, U.S. and allied forces are employed to stop the enemy advance quickly in order to minimize the loss of friendly territory. Stabilizing the front enables the further buildup of U.S. forces in the theater, which subsequently mount a counteroffensive to win the war.³³ The speed with which they can deploy to far-off battle zones and the considerable firepower they can apply against a wide range of targets makes bombers ideally suited to the exigencies of the halting phase. Bomber missions in the halting phase include strikes against enemy air defenses, command-and-control centers, weapons of mass destruction (WMD) capabilities, and, most important, armored and mechanized divisions on the march.³⁴ Advanced antiarmor weapons (the Sensor Fuzed Weapon and Wind Corrected Munitions Dispenser, for example) are critical to the effectiveness of bomber sorties against ground forces.³⁵

After the North Korean offensive is checked, and as the buildup on or near the peninsula proceeds apace, the United States obtains warning that Iraq once more is preparing to move against Kuwait and Saudi Arabia.³⁶ Baghdad presumably hopes to capitalize on U.S. preoccupation with the conflict in the Far East.³⁷ Officials in Washington promptly decide to send a large expeditionary force of air, naval, and ground units to the Persian Gulf region. Again it is assumed the enemy takes no military action to oppose the arrival of U.S. power projection forces.

29. *Report on the Bottom-Up Review*, p. 16.

30. *Ibid.*, pp. 18-19; DoD *Report for 1995*, pp. 28, 199; DoD *Report for 1996*, pp. 12, 169.

31. Dicks, in HAC FY 96, Pt. 4, p. 318; Sen. Sam Nunn, in 5ASC FY 96, Pt. 7, p. 345.

32. *Report on the Bottom-Up Review*, pp. 16, 20, 21, 29, 87; DoD *Special Briefing*, pp. 7, 12, 13, 14.

33. *Report on the Bottom-Up Review*, pp. 15-17; DoD *Report for 1995*, p. 21; DoD *Report for 1996*, pp. 5, 172-173.

34. *Report on the Bottom-Up Review*, p. 16; DoD *Report for 1995*, p. 207; DoD *Report for 1996*, p. 175.

35. Department of Defense, submission for the record, HAC FY 96, Pt. 4, p. 405; Gen. John M. Loh, Commander, Air Combat Command, in Senate Armed Services Committee, Hearings, *Department of Defense Authorization for Appropriations for Fiscal Year 1995 and the Future Years Defense Program*, Part 7, 103d Cong., 2d sess. (Washington, DC: GPO, 1994), p. 443 (hereinafter 5ASC FY 95, Pt. 7). See also *Report on the Bottom-Up Review*, pp. 19, 20, 21, 87; DoD *Report for 1995*, p. 34; DoD *Report for 1996*, p. 175.

36. Lacroix, in House Armed Services Committee, Hearings, *An Assessment of the Bottom-Up Review*, 103d Cong., 2d sess. (Washington, DC: GPO, 1994), p. 21.

37. *Report on the Bottom-Up Review*, pp. iii, 19.

The force assembled to stymie Iraq is similar to the MRC "building block" deployed to Korea. Most of these units are sent from the United States or overseas locations other than the Korean theater. Some forces, however, are shifted from MRC-West to MRC-East. Defense plans contemplate the redeployment of selected combat aircraft (for example, F-117A strike aircraft and B-2 bombers), command-and-control capabilities, and amphibious assault forces.³⁸ The planned force of somewhat more than 180 bombers (see below) is insufficient to permit the simultaneous deployment of 100 bombers to each MRC. Consequently, a number of bombers must "swing" from Korea to the Persian Gulf. In the HBFS, 50 to 65 bombers swing, including all combat-ready B-2s in the planned force.³⁹

The Iraqi invasion commences some six weeks after the start of the Korean war, following the initial deployments of U.S. forces to the Gulf.⁴⁰ MRC-East proceeds according to the same general script of MRC-West, with a halting phase, continued buildup of U.S. forces, and counteroffensive by the United States and its allies. Bombers likewise are employed in a similar fashion.

The foregoing two-MRC scenario is treated as the "baseline case" in the HBFS. The study also analyzes what is labeled a "very extreme" "excursion case"⁴¹ in which no tactical strike aircraft (such as Air Force F-15Es and Navy F/A-18s) are available during the first eight to 15 days of each conflict. This excursion is called the "No Strike TACAIR" case. The lack of tactical strike aircraft might be due to shorter warning time, inability to use local air bases (because of political restrictions or enemy attack), or the initial absence of aircraft carriers in the theater. Bombers then are the only aircraft available for conducting strikes against enemy forces. For each MRC there is, however, roughly one fighter wing (with aircraft like the F-15C) available for escorting B-52H and B-1B bombers as they penetrate enemy air defenses.⁴² (These older bombers do not have the stealth characteristics of the B-2.)

In addition, some "sensitivity excursions" from the baseline case are examined. One excursion considers the effect of no warning on the course of one MRC. Another looks at what happens in the Korean MRC if chemical attacks on in-theater air bases reduce tactical aircraft sortie rates by one-third to two-thirds in the first few weeks of the war.⁴³

38. *Ibid.*, pp. 19, 28; DoD Report for 1995, p. 31; DoD Report for 1996, p. 15; *Defense Planning Guidance for Fiscal 1996-2001*, quoted in Christine Staveren, "With Caveats, Top Military Officers Say Two Wars Can Be Won," *Defense Week*, Vol. 16, No. 8 (February 21, 1995), p. 19; Department of Defense comments, in General Accounting Office, *Bottom-Up Review: Analysis of Key DOD Assumptions*, GAO/NSIAD-95-56 (Washington, DC: GPO, January 1995), p. 53; Lacroix, in *An Assessment of the Bottom-Up Review*, p. 26.

39. Loh, in *HAC FY 96*, Pt. 4, p. 399; Loh, in *SASC FY 96*, Pt. 7, p. 390.

40. "CINCs Call Forces Sufficient to Handle Pentagon's Two-War Strategy," *Inside the Pentagon*, Vol. 11, No. 6 (February 9, 1995), p. 3; Tony Capaccio, "Bottom-Up Review Strategy Contains 'Substantial Risk,'" *Defense Week*, Vol. 16, No. 9 (February 27, 1995), p. 3; Congressional Budget Office, submission for the record, House Armed Services Committee, Hearings, *National Defense Authorization Act for Fiscal Year 1995*, HASC No. 103-32, 103d Cong., 2d sess. (Washington, DC: GPO, 1994), p. 820; Lacroix, in *An Assessment of the Bottom-Up Review*, p. 34.

41. Kaminski, in *HAC FY 96*, Pt. 4, p. 340.

42. Kaminski, in *SASC FY 96*, Pt. 7, pp. 353, 355.

43. Kaminski, in *HAC FY 96*, Pt. 4, pp. 348, 350, 372; Kaminski, in *SASC FY 96*, Pt. 7, pp. 362, 365.

The HBFS evaluates the cost-effectiveness of four alternative bomber mixes in relation to the above cases. The options are: 1) "Planned Force" (66 B-52Hs, 95 B-1Bs, and 20 B-2s);⁴⁴ 2) "Retire B-1s" (94 B-52Hs and 20 B-2s); 3) "Buy 20 More B-2s, Retire B-1s" (94 B-52Hs and 40 B-2s); and 4) "Buy 20 More B-2s" (66 B-52Hs, 95 B-1Bs, and 40 B-2s). The key issue, then, is whether there is warrant for 20 more B-2s. Along with the four force mixes, the cost-effectiveness of a larger inventory of precision-guided munitions (PGMs) and upgrades in the conventional weapon capabilities of the B-1B are analyzed as alternatives to additional B-2s.

The performance of the four bomber mixes in the two-MRC scenario is assessed for three different years: 1998, 2006, and 2014. These particular years are mandated by the congressional direction for the study.⁴⁵ The unclassified briefings on the HBFS have presented only the results for 2014, at which time a force of 20 more B-2s would be fully operational.

The Kaminski briefings discuss three metrics for gauging the effectiveness of the bomber options. The first is movement in the forward line of troops (FLOT), that is, the depth of enemy penetration into allied territory during the halting phase of the conflict. The second is "total number of aircraft lost during the individual combat missions of both MRCs."⁴⁶ Number of sorties required to achieve U.S. objectives in both wars is the third.

With this general analytic approach and a set of campaign models (which simulate ground and air warfare and match air-delivered weapons against targets), the HBFS concludes that acquisition of more than 20 B-2s is not justified. In the baseline scenario, where a large force of tactical aircraft is deployed in each MRC, additional B-2s reduce depth of enemy penetration and friendly aircraft sorties and attrition by small amounts (around five percent or less). In the excursion where no tactical strike aircraft are available in the first two weeks of conflict, 20 more B-2s do not offset their absence. For the sensitivity excursions (no warning in one MRC and attacks on theater air bases), aircraft losses are much higher than those for the baseline case, even when the planned bomber force is increased by 20 B-2s. In the end, the HBFS finds the planned force is more cost-effective than the other three bomber mixes. Moreover, the capabilities of the planned force can be enhanced in a more cost-effective manner through larger quantities of PGMs and budgeted B-1B upgrades, rather than more B-2s.

Finally, in view of past controversies concerning the B-2, it is important to note what the HBFS does *not* say. It does not dispute the stealth qualities or combat effectiveness of the aircraft. Nor does it question the value of the nonnuclear missions the B-2 can perform. These capabilities are not in doubt. The authors of the HBFS, along with top

44. Since the HBFS was completed, the number of B-2s in the planned force has increased, as noted earlier, to 21. In addition, the Air Force Chief of Staff, Gen. Ronald R. Fogleman, recently said the planned force will have 71 rather than 66 B-52Hs. See John A. Tirpak, "First Force," *Air Force Magazine*, Vol. 79, No. 9 (September 1996), p. 39.

45. Public Law 103-337, Section 133(a).

46. Kaminski, in *HAC FY 96, Pt. 4*, p. 344.

defense officials, acknowledge the significant military worth of the B-2. Officials contend, however, that additional B-2s are not affordable within projected defense budgets, often pointing to the verdict of the HBFS.⁴⁷ But affordability is not just a matter of cost. (After all, the life-cycle cost for 20 additional B-2s would amount to only a minute fraction of aggregate defense spending over the decades the bombers are likely to be in service.) Rather, cost must be balanced with requirements and capabilities. To the extent the HBFS underestimates the requirements for heavy bombers and undervalues the diverse capabilities of a larger B-2 force, the utility of that force does not counterbalance its cost and more B-2s seem unaffordable. Conversely, a more realistic assessment of requirements and capabilities, reflected in the following review of the HBFS, suggests that increasing the size of the planned B-2 force would be a prudent and affordable defense investment for the long haul.

47. For example, Robert Bell, in explaining President Clinton's February 1996 decision not to buy more than 20 B-2s, said, "The President concluded that the B-2 is a highly capable, long-range and stealthy bomber that will make important strategic and conventional contributions well into the next century. But additional B-2s would be too costly, particularly relative to other defense procurement priorities." Bell went on to cite the conclusion of the HBFS. Press Briefing, pp. 1, 3.

Critique of the HBFS

Regrettably, the HBFS analysis is faulty in its approach, assumptions, and assessment. The way in which bomber requirements are framed is flawed, and within this ill-conceived framework the study contains further errors. Despite the significant uncertainties that attend the emerging post-Cold War security environment, it concentrates on just two adversaries and one type of war, excluding other potential enemies and conflicts. It discounts surprise attack, a standard gambit of modern aggressors. It predicts the United States readily and with relative impunity can amass huge expeditionary forces near the borders of enemies possessing WMD and missiles. It expects one-half to two-thirds of deployed bombers, in a feat untried in wartime, to break off from grueling combat in one MRC, rapidly redeploy to another theater, and conduct sustained operations to blunt an armored invasion. It uses questionable methods to compare the levels of effectiveness among bombers, tactical strike aircraft, and PGMs, while failing to discuss trade-offs between bombers and other major force elements. Finally, it neglects to account for nontrivial peacetime attrition in the planned bomber force and the high cost of a few thousand yet-unbuilt stealthy tactical aircraft. In all, these faults make the HBFS a poor basis for deciding the size of the B-2 force. Each is elaborated in the sections that follow.

Planning for Tomorrow's Wars with Yesterday's Adversaries

To begin with, the HBFS does not look at a wide enough range of future contingencies in which heavy bombers might be tested. It analyzes variations in warning time, threats, availability of tactical aircraft, weapon inventories and weapon effectiveness, but not hypothetical conflicts, which are confined to the canonical two of the BUR. Invasions by North Korean and Iraqi armies against southern neighbors remain the key military challenges, while some details of the simulated conflicts vary. Unlike Cold War planning, however, U.S. force structure no longer can be geared to intricate plans for set-piece campaigns against one or two particular opponents.

Given that heavy bombers, like capital ships, now have service lives measured in decades (the expected life span of the B-2 is over 40 years),⁴⁸ the HBFS is correct in trying to weigh their war-fighting worth in 2014. But the study errs in extrapolating the two-MRC scenario out to that same date and using it as the strategic context in which alternative bomber mixes are evaluated. Political-military developments are impossible to forecast with any certainty, especially over a 20-year time frame. Few predicted, even six months beforehand, the collapse of the Soviet Union or the Coalition war against Iraq, events of great military consequence for the United States. (Just a year before Iraq

48. Commission on Roles and Missions of the Armed Forces, *Directions for Defense* (Washington, DC: GPO, 1995), p. 2-28; Loh, in House Armed Services Committee, Hearings, *National Defense Authorization Act for Fiscal Year 1993*, HASC No. 102-42, 102d Cong., 2d sess. (Washington, DC: GPO, 1992), p. 402.

invaded Kuwait, the Chairman of the Joint Chiefs of Staff argued that the disappearance of a Soviet threat to the Persian Gulf made it possible to remove that region from U.S. military planning.)⁴⁹ While predictions about the future security environment are limited by inescapable uncertainties, it seems a safe bet that the dangers of 2014 will be much different from those of the present. Planning for the last war (MRC-East echoes the Gulf War) or a potential conflict of near-term concern (the Korean MRC) clearly is not the way to structure a force that will be an important part of U.S. power projection capabilities for decades to come.

Many have questioned the usefulness of the two-MRC scenario for long-term force planning.⁵⁰ One of the more recent criticisms of this approach is contained in a study by the Institute for National Strategic Studies, a DoD organization that advises the Secretary of Defense and the Joint Chiefs of Staff. The study, a political-military forecast originally prepared for the Chairman of the Joint Chiefs,⁵¹ recommends that the United States should,

Plan for a more challenging opponent than that provided by the current benchmark of two nearly simultaneous regional conflicts. The present focus on two [MRCs] perpetuates preparations for the last war. Instead, the U.S. should be planning now against a mid-sized opponent who can tap global markets for arms, technology, and intelligence (especially from other great powers), and who knows what to do with them when he gets them. By or beyond 2015, the possibility exists that the United States might be confronted by a great power or great power coalition.⁵²

(The report, it should be noted, is called *Project 2015*, the title indicating that the forecast extends to an end point almost identical to the year highlighted in the HBFS.) Criticisms like this, along with difficulties in meeting the fiscal demands of the BUR force structure and the high incidence of change-oriented strategy reviews at the start of presidential terms, make it unlikely the two-MRC standard will be around much longer.⁵³ If, in Dr. Kaminski's words, the "two major regional contingencies [are] the whole foundation for [the HBFS] analysis,"⁵⁴ what will be the value of the study and its conclusions when that foundation crumbles?

49. Paul Wolfowitz, "A Bomber for Uncertain Times," *Wall Street Journal*, June 12, 1995, p. A12.

50. See, for example, Elliot A. Cohen, "Down the Hatch," *New Republic*, Vol. 210, No. 10 (March 7, 1994), pp. 14-19; Andrew F. Krepinevich, *The Bottom-Up Review: An Assessment* (Washington, DC: Defense Budget Project, February 1994); Thomas L. McNaughton, in "The Coming Defense Train Wreck ... And What to Do about It," *Washington Quarterly*, Vol. 19, No. 1 (Winter 1996), pp. 117-120.

51. Jason Glashow, "Regional Powers May Gain Clout," *Defense News*, Vol. 11, No. 10 (March 11-17, 1996), p. 36.

52. Institute for National Strategic Studies, *Project 2015* (executive summary) (Washington, DC: National Defense University, forthcoming 1996).

53. DoD officials are planning now for a 1997 "Quadrennial Program Review" that will reassess national military strategy and defense force structure. See Jeff Erlich and Philip Finnegan, "Senators Envision Renewed Military Strategy," *Defense News*, Vol. 11, No. 25 (June 24-30, 1996), pp. 1, 74; Suzann Chapman, "Aerospace World: New Review in the Works," *Air Force Magazine*, Vol. 79, No. 7 (July 1996), p. 13.

54. DoD Special Briefing, p. 15.

Regardless of the fate of the two-MRC scenario in any upcoming strategy review, its constituent conflicts simply are not plausible as 21st-century contingencies. Current problems with North Korea and Iraq almost certainly will be resolved—one way or another—before 2014. In the case of North Korea, a deteriorating economy, a famine-producing agricultural system, and an unstable regime could cause, within the next few years, the breakdown of the Stalinist state followed by the outbreak of another Korean war (or vice versa). Secretary of Defense William Perry foresees a North Korean collapse and believes the remaining uncertainty is "whether it will be with a bang or a whimper."⁵⁵ Viewing the "bang" as a serious risk, the commander of U.S. forces in Korea—the man charged with defeating the North in a real MRC-West—warned in early 1996 that,

As we watch this [worsening economic] situation and severe food shortages develop in [North Korea], the question is not: Will this country disintegrate? But rather, how will it disintegrate, by implosion or explosion? And when? We worry that in a very short period, this country will either collapse or take aggressive actions against the South in a desperate attempt to divert attention from its internal situation.⁵⁶

According to an area specialist who recently served as the National Intelligence Officer for East Asia, the "very short period" might be no longer than two or three years.⁵⁷

By 2014, Saddam Hussein's Iraq in all likelihood also will not be among the primary threats to U.S. security interests. Until recently, U.S. officials on more than one occasion spoke of the possibility that Saddam's regime could come to an abrupt end.⁵⁸ Although Saddam's position now appears to be improving, his long-term future remains uncertain. His departure from the scene could change significantly the security situation in the Gulf region and thus the value of MRC-East as a basis for defense planning. Planning for a war against Iraq two decades hence, it might be added, is a bit like arguing after the fall of Saigon that the United States should be prepared for a rematch with the Vietnamese communists in the mid-1990s.

For the long run, the relevance of the Persian Gulf MRC is as limited as that of its East Asian counterpart. The international security environment will change so much over the next 20 years that there is little sense in deriving requirements for bombers and

55. Remarks in a discussion with editors of *The Wall Street Journal*, cited in George Melloan, "If North Korea Folds, What Comes Next?" *Wall Street Journal*, June 3, 1996, p. A15. See also Perry's comments in John J. Fialka, "Administration To Set Accord Over Missiles," *Wall Street Journal*, May 24, 1996, p. A12.

56. Gen. Gary E. Luck, Prepared statement before the House National Security Committee, March 28, 1996 (photocopy), p. 3. See also remarks by Col. John W. Reitz, spokesman for U.S. forces in Korea, in Nicholas D. Kristof, "North Korea Wouldn't Invade the South, Would It?" *New York Times*, April 14, 1996, p. E5; John Deutch, Director of Central Intelligence, in Senate Select Committee on Intelligence, Hearings, *Current and Projected National Security Threats to the United States and Its Interests Abroad*, 104th Cong., 2d sess. (Washington, DC: GPO, 1996), p. 13; Lt. Gen. Patrick M. Hughes, Director of the Defense Intelligence Agency, in *ibid.*, pp. 240-241; "ROK: UNC Devising Measures To Deal With Possible DPRK Collapse," Foreign Broadcast Information Service, *Daily Report: East Asia*, FBIS-EAS-96-122, June 24, 1996, p. 47.

57. Ezra Vogel, cited in Mary Jordan, "Speculation Grows on Demise of N. Korea," *Washington Post*, April 6, 1996, p. A11. Vogel was NIO for East Asia from September 1993 to June 1995, when he returned to Harvard University.

58. Deutch, in *Current and Projected National Security Threats to the United States and Its Interests Abroad* (1996), p. 7; Gen. J. H. Binford Peay, Commander in Chief, Central Command, "Interview," *Jane's Defence Weekly*, Vol. 25, No. 21 (May 22, 1996), p. 40.

other forces from just two well-defined hypothetical conflicts with detailed orders of battle and elaborate campaign plans.

In fact, the next military opponent of the United States cannot be known with any certainty and could be any of several currently or potentially hostile powers. To some extent, this was recognized in the BUR, which conceded that the United States very well could face an enemy—"Country X"—other than North Korea or Iraq, and rightly cautioned, "History suggests that we most often deter the conflicts that we plan for and actually fight the ones we do not anticipate."⁵⁹ Unfortunately, there is no "Country X" in the analysis for the HBFS.

In the future, the United States must be ready for, as the *Project 2015* report counsels, not only competent and even challenging "mid-sized opponents" like Iraq or North Korea, but also a rival "great power" or an antagonistic "great power" axis. The hostile great power might be a rising China, with the saber rattling that preceded the March 1996 Taiwanese presidential election presaging more dangerous aggression by Beijing.⁶⁰ Indeed, in circa-2010 war games played at the Naval War College less than a year before the HBFS began, a belligerent China, armed with advanced conventional weapons, reportedly routed U.S. naval forces.⁶¹ War with China would be very different from the simulated MRCs with North Korea and Iraq, with an armored thrust across the Taiwan Strait quite unlikely. In general, the "Country X" conflicts that are absent from the HBFS may involve the need to project power far inland, away from waters plied by aircraft carriers and air bases situated in allied countries, even if the immediate scene of the conflict is along a continental periphery. In particular, for an East Asian conflict other than a second Korean war, the lack of basing and the expanse of the theater would limit the effectiveness of shorter-range tactical strike aircraft. Heavy bombers, with their intercontinental range, would be much less constrained.

Those responsible for the HBFS undoubtedly recognized the uncertainties of the future security environment. In one of his congressional briefings on the study, Dr. Kaminski acknowledged that "anybody who would sit here and say he can project with accuracy for 30 years would be mistaken. My crystal ball isn't that clear for that period of time."⁶² His comment was similar to an earlier admission by authors of the BUR report that, "it is difficult to predict precisely what threats we will confront ten or twenty years from now."⁶³ This sound advice was not followed, however, in the HBFS, which has the United States battling Iraqis and North Koreans in 2014, to the utter exclusion of other plausible opponents.

59. *Report on the Bottom-Up Review*, pp. 14-15.

60. On the possibilities for military confrontation with China, see Arthur Waldron, "Deterring China," *Commentary*, Vol. 100, No. 4 (October 1995), pp. 17-21; Waldron, in Senate Foreign Relations Committee, Hearings, *The Growth and Role of the Chinese Military*, 104th Cong., 1st sess. (Washington, DC: GPO, 1996), pp. 70-74; Andrew Krepinovich, *Restructuring Defense for a New Era: The Value of Scenario-Based Planning* (Washington, DC: Center for Strategic and Budgetary Assessments, January 31, 1996).

61. Barbara Opall, "China Sinks U.S. In Simulated War," *Defense News*, Vol. 10, No. 4 (January 30-February 5, 1995), p. 1.

62. Kaminski, in *HAC FY 96, Pt. 4*, p. 388.

63. *Report on the Bottom-Up Review*, p. 19.

Narrow Application of Multimission Bombers

Along with its focus on a pair of conflicts against old foes, the HBFS—unfortunately like many other analyses of the operational value and effectiveness of the B-2—concentrates on one application of heavy bombers, slighting others. Air Force doctrine, however, long has stressed the essential flexibility of bombers and other strike aircraft, and specifies multiple missions for offensive air power: counterair operations, strategic attack, air interdiction, and close air support.⁶⁴ Although bomber sorties may be allocated to each of these missions in the twin MRCs of the HBFS, both simulated conflicts center on the defense of a U.S. ally against an invading armored force and, as a result, highlight air interdiction (operations against enemy military potential—troops, equipment, supplies—before it can be brought to bear against friendly forces). The historical record of the past half century offers strong evidence that any assessment of the military worth of a larger or improved bomber force should be based on a broader evaluation of how that force performs in the full range of air power missions.

Counterair operations are aimed at securing control of the air and denying the enemy use of a specified airspace. Air control enables the conduct of air and surface operations without the prohibitive interference of enemy air forces. Offensive counterair operations involve attacks on warning and control systems, air bases, anti-aircraft artillery, and surface-to-air missile batteries. From World War II to the Gulf War, bombers have been used for the offensive counterair mission.⁶⁵ Because of its ability to evade detection by ground-based and airborne sensors, the B-2 will be especially suitable for destroying or neutralizing enemy defenses, in much the same way the stealthy F-117A was instrumental in shutting down the Iraqi air defense system in the initial phase of the Desert Storm air campaign.⁶⁶ In fact, longer range, larger payload, and greater stealthiness would give the B-2 advantages over the F-117A in the counterair role.⁶⁷ With the continuing proliferation of advanced surface-to-air missiles and combat aircraft,⁶⁸ the retirement of aircraft (the F-4G and EF-111) that suppress enemy air defenses,⁶⁹ and the substantial share of nonstealthy fighter and attack aircraft in the force

64. United States Air Force, *Basic Aerospace Doctrine of the United States Air Force, Air Force Manual 1-1, Volume I* (Washington, DC: GPO, March 1992), pp. 5-7, 10-13; *Volume II*, pp. 82-83, 135-172.

65. Richard C. Boys, *The Campaign for Air Superiority During the Strategic Air Offensive Against Germany in World War II* (Maxwell AFB, AL: Air War College, Air University, May 1953); Robert Frank Futrell, *The United States Air Force in Korea, 1950-1953*, revised edition (Washington, DC: Office of Air Force History, 1983), pp. 98-103; Robert R. Kritt, "B-52 Arc Light Operations," in Carl Berger, ed., *The United States Air Force in Southeast Asia, 1961-1973: An Illustrated Account*, revised edition (Washington, DC: Office of Air Force History, 1984), pp. 160, 165-167; *Gulf War Air Power Survey* [hereinafter GWAFS], Vol. IV, Part I: *Weapons, Tactics, and Training* (Washington, DC: GPO, 1993), p. 51.

66. GWAFS, Vol. IV, Pt. I, pp. 172-175, 185-186, 189.

67. The B-2 has more than 10 times the payload and five times the unrefueled range of the F-117A. In addition, the bomber incorporates more advanced low-observable technology. Lt. Gen. Charles A. Horner, Commander, Central Command Air Forces, in House Appropriations Committee, Hearings, *Department of Defense Appropriations for 1992, Part 5*, 102d Cong., 1st sess. (Washington, DC: GPO, 1991), p. 489; Department of the Air Force, "The B-2 in Perspective," reprinted in Senate Armed Services Committee, Hearings, *Department of Defense Authorization for Appropriations for Fiscal Years 1990 and 1991, Part 6*, 101st Cong., 1st sess. (Washington, DC: GPO, 1989), p. 337 (hereinafter SASC FY 90 & 91, Pt. 6).

68. Department of the Air Force, *White Paper on Air Force Fighter Modernization* (Washington, DC: Department of the Air Force, April 1996), pp. 3-5; Office of Naval Intelligence, *Worldwide Challenges to Naval Strike Warfare* (Washington, DC: ONI, January 1996).

69. General Accounting Office, *Combat Air Power: Funding Priority for Suppression of Enemy Air Defenses May Be Too Low*, GAO/NSIAD-96-123 (Washington, DC: GAO, April 1996).

structure through 2014,⁷⁰ the offensive counterair capabilities of the B-2 should not be undervalued.

Strategic attack is the mission most often associated with heavy bombers. Strategic attack operations are directed against the vital war-making capacity of an opposing state to destroy the enemy's ability or will to wage war. Defense-related industries, political and military command-and-control centers, transportation networks, electrical power systems, and WMD capabilities are potential targets for strategic attack. While the strategic strikes in each HBFS MRC are part of an air-land offensive, strategic attack also can take the form of an autonomous air operation. The largely independent strategic air campaigns against Nazi Germany and Imperial Japan, through their direct and indirect effects, made decisive contributions to the Allied victory in World War II.⁷¹ The short and intense Linebacker II campaign, in which B-52s dropped 15,000 tons of bombs on 30-odd strategic targets in less than two weeks, compelled Hanoi to accept a peace agreement that permitted an end to U.S. military involvement in the Vietnam War.⁷² B-52s also participated, though less significantly, in the air campaign against Iraq,⁷³ which was conducted to remove an occupying army, not repel an invading armored force, and which "dominated the military outcome of Operation Desert Storm."⁷⁴ Given that heavy bombers have been used in strategic campaigns in every war fought by the United States since Pearl Harbor,⁷⁵ judgments about the cost-effectiveness of an augmented bomber force should rest, in part, on analyses of its value for such operations.

Bombers also can carry out more limited strategic attacks. In the future, punitive strikes by long-range air power might be a preferred means for combating terrorism, countering subversion of an allied government by a hostile power, influencing the outcome of lesser conflicts, and, in general, supporting international order.⁷⁶ Operation El Dorado Canyon is a case in point. In April 1986, Air Force and Navy strike aircraft hit several targets in Libya to punish its ruler, Col. Muammar Qadhafi, for supporting a series of terrorist acts.⁷⁷ This raid, which required nearly 120 combat and support

70. DoD Report for 1996, pp. 180-183; Department of the Air Force, *White Paper on Strategy and Force Structure* (Washington, DC: Department of the Air Force, April 1996), p. 7.

71. For a balanced and insightful appraisal of the effectiveness of the World War II bomber offensives, see Richard Overy, *Why the Allies Won* (New York: W.W. Norton & Co., 1996), pp. 101-133.

72. Karl J. Eschmann, *Linebacker: The Untold Story of the Air Raids Over North Vietnam* (New York: Ivy Books, 1989); Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (New York: Free Press, 1989), pp. 177-202.

73. Department of Defense, *Conduct of the Persian Gulf War*, Final Report to Congress (Washington, DC: GPO, April 1992) pp. 674-676.

74. GWAPS, Vol. II, Part II: *Effects and Effectiveness*, p. 381.

75. On the strategic bombing campaign in the Korean War, see *The United States Air Force in Korea, 1950-1953*, pp. 183-198.

76. See Eliot A. Cohen, "What To Do About National Defense," *Commentary*, Vol. 98, No. 5 (November 1994), pp. 26-27.

77. Joseph T. Stanik, "Welcome to El Dorado Canyon," *U.S. Naval Institute Proceedings*, Vol. 122, No. 4 (April 1996), pp. 57-62.

aircraft, could have been executed by just six B-2s, refueled by a like number of aerial tankers.⁷⁸

Another purpose of limited strategic attack might be to defang a WMD-armed adversary. The June 1981 Israeli air strike against Iraq's Osirak nuclear reactor was a disarming strategic attack.⁷⁹ The United States, too, might find it necessary to take preventive action to eliminate the WMD capabilities of a "rogue state." This option has been weighed by U.S. decisionmakers in the past and undoubtedly will receive more attention in the future. In June 1994, for example, the Secretary of Defense "looked very carefully at what would be required" for "going in and taking out" a North Korean reactor whose spent fuel could yield plutonium for nuclear weapons.⁸⁰ Less than two years later, he made clear that the United States was "prepared to take preventive measures to keep Libya from posing...a threat to peace and stability" by completing work on an underground chemical weapons plant.⁸¹ Though limited in objective, a disarming attack could be large in scale. WMD facilities and forces marked for destruction could comprise a set of difficult targets, protected by numbers, dispersal, redundancy, concealment, hardening, and active defense. Almost 2,500 strikes were launched against Iraqi WMD and Scud-related targets over the six-week Gulf War.⁸² (Despite this weight of effort, critical elements of Iraq's WMD and missile potential remained intact, due mainly to deficient intelligence and problems in targeting mobile Scuds.)⁸³ Because a disarming strategic attack could encompass a sizable and challenging target system, would be most effective if done quickly and with surprise (to thwart certain enemy countermeasures), might be hard to launch from overseas bases (if host countries opposed the move), and could entail missions with flight distances beyond the range of tactical aircraft, a larger force of B-2 bombers could be necessary for this mission.

Bomber sorties in each paper war of the HBFS apparently stem the enemy ground offensive through *force* interdiction, that is, the attack of maneuver units and choke points on invasion routes. In other, more protracted types of conflict, bombers also could fly *supply* interdiction sorties that would strike depots, roadways, rail lines, bridges, trucks, trains, and other targets to stanch the flow of matériel to frontline units.⁸⁴ Supply

78. Department of the Air Force, "The B-2 in Perspective," in SASC FY 90 & 91, p. 340; Department of the Air Force, *Bomber Modernization: Deterrence at the Crossroads* (Washington, DC: Department of the Air Force, June 1990).

79. Shlomo Nakdimon, *First Strike: The Exclusive Story of How Israel Foiled Iraq's Attempt to Get the Bomb* (New York: Summit Books, 1987).

80. Perry, in Senate Foreign Relations Committee, Hearings, *North Korea Nuclear Agreement*, 104th Cong., 1st sess. (Washington, DC: GPO, 1995), p. 15. See also Steve Coll and David B. Ottaway, "New Threats Create Doubt in U.S. Policy," *Washington Post*, April 13, 1995, p. A27.

81. Perry, "Weapons of Mass Destruction," Remarks at Georgetown University, April 18, 1996 (Federal News Service transcript). See also Philip Shenon, "Perry, in Egypt, Warns Libya to Halt Chemical Weapons Plant," *New York Times*, April 4, 1996, p. A6.

82. GWAPS, Vol. II, Pt. II, pp. 322, 324, 331-332.

83. Kathleen C. Bailey, *The UN Inspections in Iraq: Lessons for On-Site Verification* (Boulder, CO: Westview Press, 1995); Central Intelligence Agency, submission for the record, Senate Select Committee on Intelligence, Hearings, *Worldwide Intelligence Review*, 104th Cong., 1st sess. (Washington, DC: GPO, 1995), p. 110; GWAPS, Vol. II, Pt. II, pp. 316-317, 322, 326-336, 343-345.

84. "Force" and "supply" interdiction are distinguished in Edmund Dews and Felix Kozaczka, *Air Interdiction: Lessons from Past Campaigns*, N-1743-PA&E (Santa Monica, CA: RAND Corp., September 1981), p. 10.

interdiction has been one of the missions assigned to bombers in each U.S. war of the last half century. Analysis of past interdiction operations shows that under certain conditions this application of air power can be useful in undermining an opponent's military strength.⁸⁵ Against adversaries heavily dependent on shipping for military resupply and economic trade, enemy sea traffic can be interdicted through aerial mining. Thousands of mines sown in hundreds of sorties by B-29 bombers were highly effective in blockading Japanese home waters in the last five months of World War II.⁸⁶ The large payloads of heavy bombers make them well-suited for minelaying; a B-2 can plant up to 80 naval mines in a single sortie.⁸⁷

The mission of close air support is similar to force interdiction, except that the enemy is in close proximity to friendly ground forces. Close air support has not been as frequent a bomber mission as counterair operations, strategic attack, and air interdiction. Nonetheless, there are examples of bombers employed in this manner. Saturation bombing by B-17s and B-24s battered an elite German panzer division (at the cost of a few hundred U.S. Army casualties from short bombing), and thereby aided the Allied breakout from the Normandy bridgehead in July 1944.⁸⁸ Nearly 25 years later, B-52s contributed to the defense of the besieged Marine base at Khe Sanh, flying, over a two-month period, 2,500 sorties and delivering 60,000 tons of bombs against the surrounding North Vietnamese forces. In a number of cases, bombs were dropped as close as one kilometer (km) from the base perimeter.⁸⁹ (Seventy-five B-2s—or 110 B-52Hs, with support aircraft—would be needed to mount an operation of this sort.)⁹⁰ Based on publicly available sources, it is unclear whether the HBFS includes close air support sorties by heavy bombers.

In short, the conflicts modeled in the study fail to capture fully the multimission flexibility of the B-2 and its predecessors. The last 50 years have seen bombers undertake a wide range of missions. Similar versatility is likely to mark the uses of the B-2 during its long service life, a period of comparable extent. This is recognized by a congressionally mandated, DoD-sponsored study of the bomber industrial base, a study done as part of the overall HBFS effort:

85. For a comprehensive discussion of U.S. interdiction campaigns in World War II, the Korean War, and the Vietnam War, see Eduard Mark, *Aerial Interdiction: Air Power and the Land Battle in Three American Wars* (Washington, DC: Center for Air Force History, 1994). During the Gulf War, B-52s struck railroads and storage facilities for petroleum, oils, and lubricants. *GWAPS*, Vol. IV, Pt. I, p. 51. For an analysis of supply interdiction operations in that conflict, see *GWAPS*, Vol. II, Pt. II, pp. 170-202.

86. See Kenneth P. Werrell, *Blankets of Fire: U.S. Bombers over Japan during World War II* (Washington, DC: Smithsonian Institution Press, 1996), pp. 173-176, 189, 200-201, 220-221, 231-234, 240-241; Frederick M. Sallagar, *Lessons from an Aerial Mining Campaign (Operation "Starvation")*, R-1322-FR (Santa Monica, CA: RAND Corp., April 1974).

87. "Bomber Weapons Loading," April 11, 1994, table submitted for the record by the Department of the Air Force, in House Appropriations Committee, Hearings, *Department of Defense Appropriations for 1995, Part 4*, 103d Cong., 2d sess. (Washington, DC: GPO, 1994), p. 422.

88. Richard P. Hallion, *Strike from the Sky: The History of Battlefield Air Attack, 1911-1945* (Washington, DC: Smithsonian Institution Press, 1989), pp. 206-214.

89. Bernard C. Nalty, *Air Power and the Fight for Khe Sanh* (Washington, DC: Office of Air Force History, 1973), pp. 82-88.

90. Gen. Merrill A. McPeak, Air Force Chief of Staff, submission for the record, Senate Armed Services Committee, Hearings, *Department of Defense Authorization for Appropriations for Fiscal Years 1992 and 1993, Part 7*, 102d Cong., 1st sess. (Washington, DC: GPO, 1991), pp. 841-842.

Since the advent of the modern bomber, the missions, operations, and configurations of these aircraft have evolved to respond to changing threats. Despite the B-2's limited operational life, the changes have affected the B-2 as they have all bombers since the B-52. [Past experience with the B-52 underscores] a key consideration in defining a next-generation bomber and potential employment of the B-2: *long-lived heavy bomber designs will be assigned new missions and will be used in "unorthodox" ways to solve unanticipated operational problems or take advantage of new technological developments.*⁹¹

Conflicts of different sizes and shapes would alter both the number and mix of bomber sorties demanded (more strategic attack and fewer air interdiction sorties, for example), and also would change bomber force requirements. Bombers inherently can be employed in various kinds of wars, campaigns, and operations, and any analysis of their value should reflect this fact. The analytic approach of the HBFS is akin to judging a decathlete primarily on the basis of his time in the 400-meter run.

Underestimation of the Likelihood of Surprise

Within the constricted two-MRC planning framework, the HBFS has more critical shortcomings that raise further questions about the validity of its results. As noted, the baseline case assumes the United States has 14 days of strategic warning. Warning is essential for the prewar, in-theater buildup of U.S. forces. In actuality, such warning may not be available. With regard to MRC-West, the anticipated aggressor, North Korea, is well-prepared for a surprise attack, if it chooses war. Two-thirds of its million-man army is deployed less than 100 km from the demilitarized zone (DMZ) dividing the peninsula. Long-range artillery and missiles are sited within range of Seoul. Numerous combat aircraft recently deployed to airfields near the DMZ are just six minutes' flying time from the South Korean capital.⁹² These and other conditions create a military situation in which surprise attack not only is possible, but likely. According to an assessment by the Defense Intelligence Agency,

The North's offensive strategy emphasizes surprise. Pyongyang's military disposition and militaristic society make warning in Korea difficult. Many of the traditional indicators that provide the Intelligence Community with warning of war, such as movement of forces forward and diversion of civilian economic assets to the military, already exist in North Korea. North Korea's military forces and logistics are forward deployed, minimizing the requirement for additional movement and enabling the North to quickly transition from a peacetime footing to war. These developments impede the U.S. Intelligence Community's ability to provide timely warning of war on the peninsula.

91. TASC Inc., *Heavy Bomber Industrial Capabilities Study*, Final Report (Arlington, VA: TASC Inc., December 1995), p. 7 (emphasis in original). This report was prepared under contract to the Under Secretary of Defense for Acquisition and Technology.

92. Adm. William O. Studeman, Acting Director of Central Intelligence, in Senate Armed Services Committee, Hearings, *Worldwide Threat to the United States*, 104th Cong., 1st sess. (Washington, DC: GPO, 1995), p. 9; Luck, Prepared statement before the House National Security Committee, p. 4; Adm. Joseph W. Frueher, Commander in Chief, Pacific Command, Prepared statement before the Senate Armed Services Committee, March 28, 1996 (photocopy), pp. 8-9; Deutch and Hughes, *Current and Projected National Security Threats to the United States and Its Interests Abroad* (1996), pp. 6, 240.

The Intelligence Community is unable to decipher North Korea's political intentions because of a paucity of reliable human sources and a lack of insight into the political decisionmaking process in North Korea. However, it is know[n] that North Korea is now faced with an increasing[ly] worsening economy and international isolation. Pyongyang's large standing Army and tenuous political situation make the possibility of war on the peninsula real.⁹³

John Deutch, the Director of Central Intelligence, offered a similar view in February 1996, when he told Congress that the North Korean "army's force structure, deployment, and training emphasize offensive operations and it is positioned and equipped to launch an aggressive attack southward *with little or no warning*."⁹⁴ The Korean War began with a surprise attack in June 1950.⁹⁵ A real MRC-West could start in the same way.

In the case of MRC-East, Iraq "retains the capability to mobilize and move large numbers of forces quickly to threaten Kuwait and Saudi Arabia,"⁹⁶ despite losses in the Gulf War and sanctions imposed by the United Nations. U.S. intelligence analysts reportedly believe that Iraq now can move five armored divisions against Kuwait on only 12 hours' notice.⁹⁷ In the fall of 1994, when Iraqi military movements once again endangered Kuwait, analysts concluded that five divisions could attack the emirate in seven days, half the warning time assumed in the HBFS.⁹⁸ (A vanguard of just three divisions seized Kuwait in August 1990.)⁹⁹ In light of intelligence estimates of the suddenness with which Iraq and North Korea can attack their neighbors, it is not surprising that two commands with responsibilities for fighting MRC-East and MRC-West disagree with the warning time assumed by DoD, maintaining that significantly less time would be available.¹⁰⁰

Warning problems are not confined to the specific contingencies analyzed in the bomber study and are not simply a matter of the speed or stealth with which an attack could be launched. Past regional conflicts (the Gulf War, for example) have broken out with minimal warning. In general, the historical record of the last 50 years shows that an aggressor intent on achieving surprise almost certainly will succeed. This conclusion is supported by a careful study that examined nearly a dozen cases of surprise attack. Among the cases were the German invasion of the Soviet Union, the Japanese attack on

93. Lt. Gen. James R. Clapper, Director of the Defense Intelligence Agency, submission for the record, Senate Select Committee on Intelligence, *Hearings, Current and Projected National Security Threats to the United States and Its Interests Abroad*, 103d Cong., 2d sess. (Washington, DC: GPO, 1994), p. 95.

94. Deutch, in *Current and Projected National Security Threats to the United States and Its Interests Abroad* (1996), p. 6 (emphasis added).

95. See H. A. DeWeerd, "Strategic Surprise in the Korean War," *Orbis*, Vol. 6, No. 3 (Fall 1962), pp. 435-444, 451-452.

96. Gen. J. H. Binford Peay III, Commander in Chief, Central Command, Prepared statement before the Senate Armed Services Committee, March 19, 1996 (photocopy), p. 5.

97. Douglas Jehl, "U.S. Ships Steam to Gulf In Response to Iraqi Move," *New York Times*, January 30, 1996, p. A6.

98. Gen. J. H. Binford Peay III, "The Five Pillars of Peace in the Central Region," *Joint Force Quarterly*, No. 9 (Autumn 1995), p. 32.

99. *Conduct of the Persian Gulf War*, p. 3.

100. *Bottom-Up Review: Analysis of Key DOD Assumptions*, p. 41; General Accounting Office, *Bottom-Up Review: Analysis of DOD War Game to Test Key Assumptions*, GAO/NSIAD-96-170 (Washington, DC: GAO, June 1996), p. 7.

Pearl Harbor, the North Korean attack against the South, and the 1973 Egyptian-Syrian attack on Israel. The study found that surprise attack is almost inevitable, that such an attack invariably involves a surprise in timing, and that strategic warning typically is tardy.¹⁰¹ Other analyses of the same, as well as additional cases corroborate the findings of the study.¹⁰² Contrary to the assumption of some,¹⁰³ the failure to anticipate attack is not due primarily to a dearth of intelligence data or technical deficiencies in intelligence-gathering capabilities. Rather, surprise results from irreducible ambiguities in intelligence information, bureaucratic pathologies in intelligence organizations, and other problems for which there are no easy remedies, notably misperceptions and hesitations by national leaders. Lack of a single adversary, like the Soviet Union, as the pivot for U.S. intelligence activity, defense planning, and crisis decisionmaking compounds these problems and increases the risk of surprise.

The baseline case also assumes that once warning is obtained, the military reaction by the United States will be prompt. U.S. leaders, however, may delay a military response because warning indicators are unclear, diplomatic alternatives seem available, domestic or allied support is lacking, the potential aggressor might be provoked, or forward-deployed forces would be vulnerable to attack by weapons of mass destruction.¹⁰⁴ (An adversary could take steps intended to heighten all these concerns.) Indeed, surprise attacks generally succeed because the response to warning is not prompt. As one comparative analysis of surprise attacks explains,

The principal cause of surprise is not the failure of intelligence but the unwillingness of political leaders to believe intelligence or to react to it with sufficient dispatch.

...All major sudden attacks occurred in situations of prolonged tension, during which the victim state's leaders recognized that war might be on the horizon. Surprise succeeded despite ample political warning and, paradoxically, in some cases because of it. Conscious of the possibility of war and faced with evidence of developing enemy readiness to strike, leaders nevertheless often do not authorize effective counterpreparations. On the operational level, they misestimate the timing or locale of the enemy strike; or on the political level they perceive alternative unthreatening explanations for the enemy military activity, think that deterrence will hold for a longer time, or believe they can turn the danger away by diplomatic initiatives or reassuring inaction. In short, the primary problem in major strategic surprises is not intelligence warning but political disbelief. This problem is vexing because it is not due to stupidity

101. Ephraim Kam, *Surprise Attack: The Victim's Perspective* (Cambridge, MA: Harvard University Press, 1988), pp. 14, 30, 212.

102. See, for example, Richard K. Betts, *Surprise Attack: Lessons for Defense Planning* (Washington, DC: Brookings Institution, 1982); Patrick Morgan, "The Opportunity for a Strategic Surprise," in Klaus Knorr and Patrick Morgan, eds., *Strategic Military Surprise: Incentives and Opportunities* (New Brunswick, NJ: Transaction Books, 1983), pp. 193-245.

103. For example, the Minority Staff of the House National Security Committee: "B-2 proponents claim that the B-2 is particularly suited for providing a meaningful crisis response when we don't have 14 days warning. ...A better investment, if needed, would be to ensure that we have the technical intelligence gathering capability to provide adequate warning." "B-2 Floor Points," n.d. (around June 1995), pp. 5, 6.

104. See *Surprise Attack: The Victim's Perspective*, *Surprise Attack: Lessons for Defense Planning*, and "The Opportunity for Strategic Surprise" for some of the reasons why warning may not lead to a timely response.

or cowardice. There are often valid reasons for reticence, since precipitous response may escalate a crisis that can still be defused.¹⁰⁵

Past experience and current realities, then, argue strongly that the short-warning case should have been the baseline, and not the excursion in the HBFS. With "little or no warning," the big buildup before each MRC is absent or attenuated, and greater reliance must be placed on forces that can reach the theater rapidly and arrest the enemy attack on arrival. From the United States, heavy bombers can fly to any location within 24 hours and deliver large payloads against enemy forces and facilities without first landing at overseas bases. Short-warning conflicts are likely to require more bombers than contingencies for which there is time to move a Desert Storm-sized expeditionary force to the theater before the outbreak of hostilities.

Uncertain Availability, Adequacy, and Safety of Overseas Bases

For the two MRCs of the HBFS, substantial basing infrastructure is available and sizable forward-deployed forces are present. As admitted by the Joint Staff's Deputy Director for Force Structure and Resources, "both of these scenarios provide relatively mature infrastructures, that is, bases, ports, and airfields to accommodate our arrival in theater."¹⁰⁶ Given limitations on the basing available in much of the world, it is imprudent to assume these conditions will be the norm.¹⁰⁷ Like short warning, basing limitations should have been part of the baseline case for the HBFS, not the excursion.

For alternative future contingencies, there may be a lack of in-theater bases (for possible conflicts in, say, Southeast Asia or Central Eurasia). Since the end of the Cold War, the number of major Air Force bases overseas has declined from nearly 40 to less than 20.¹⁰⁸ Between 1989 and 1994, the number of bases in Europe dropped from 12 to five, the number in the Asia-Pacific region from seven to four.¹⁰⁹ Foreign bases that are available may lack the capacity to accommodate a large-scale U.S. buildup. Few will merit the following description of the infrastructure that awaited U.S. forces deploying for Operations Desert Shield/Desert Storm, the MRC-East prototype: "never has an expeditionary force deployed to a region so well-endowed with air and sea ports, first-class roads, and a wealthy local economy to provide various support services."¹¹⁰ For the short wars postulated in the HBFS, the United States will not have the luxury of building

105. *Surprise Attack: Lessons for Defense Planning*, pp. 4, 18 (emphasis in original).

106. Lacroix, in *SASC FY 95*, Pt. 1, p. 698.

107. For an overview of some of the limits on the availability of air bases, see Adam B. Siegel, *Basing and Other Constraints on Land-Based Aviation Contributions to U.S. Contingency Operations* (Alexandria, VA: Center for Naval Analyses, March 1995). See also National Security Research, Inc., *Worldwide Access to Air Bases for Contingency Operations* (Fairfax, VA: NSR, June 1991).

108. Charles M. Perry, Robert L. Pfaltzgraff, Jr., and Joseph C. Conway, *Long-Range Bombers & the Role of Airpower in the New Century* (Cambridge, MA: Institute for Foreign Policy Analysis, 1995), p. 14.

109. Gen. John M. Loh, USAF, "Adapting U.S. Military Organizations to the New Security Environment," *Strategic Review*, Vol. 22, No. 2 (Spring 1994), p. 8.

110. Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey Summary Report* (Washington, DC: GPO, 1993), p. 179.

or enlarging nearly 20 main air bases, as it did in the Vietnam War.¹¹¹ In the first years of that conflict, before the local base infrastructure could accommodate the buildup of U.S. land-based tactical strike aircraft, B-52s based on Guam and aircraft from a carrier stationed off the coast of South Vietnam were used to support friendly ground operations.¹¹²

If adequate bases are located within the theater, the United States nonetheless may be denied access for political reasons. For example, during Operation Vigilant Warrior (the October 1994 deployment of U.S. forces to Southwest Asia when another Iraqi invasion of Kuwait appeared imminent), the Turkish government, because of domestic political considerations, expressed reluctance to allow U.S. operations from Incirlik Air Base.¹¹³ Similarly, during Operation Deliberate Force (the August-September 1995 NATO air campaign against Bosnian Serb forces), Italian pique prevented the deployment of F-117As to Aviano Air Base.¹¹⁴

Countries also may deny base access for fear of becoming targets of missile strikes. This problem was explained in a recent book by the then-Vice Chairman of the Joint Chiefs of Staff:

Even if potential regional opponents of the United States recognize the military limitations of their missiles, they may see them as a means of denying U.S. access to bases in the region. As terror weapons, ballistic missiles offer a nation a kind of deterrence, not against the United States, perhaps, but against other nations in the region that by granting base access to U.S. forces would allow the United States to bring decisive military power to bear. Threatening to attack population centers in those neighboring countries if they allow U.S. or U.S.-led coalitions to use their territory may not prevent them from doing so—but the neighboring countries cannot ignore such threats.¹¹⁵

Shortly after the book was published, Col. Qadhafi threatened to launch missiles against Naples if the Sixth Fleet again undertook military operations against Libya.¹¹⁶

Where bases for combat aircraft and other forces are available and accessible, the facilities themselves may be vulnerable to missile or air strikes, acts of sabotage, or

111. Bernard J. Terrmena, "Logistics," in *The United States Air Force in Southeast Asia, 1961-1973*, p. 245.

112. *Basing and Other Constraints on Land-Based Aviation Contributions to U.S. Contingency Operations*, p. 17.

113. Umüt Enginsoy and Barbara Opall, "Politics Alters Turk Stance on Gulf War," *Defense News*, Vol. 9, No. 41 (October 17-23, 1994), p. 4.

114. Celestine Bohlen, "Italy Demands a Little Respect," *New York Times*, September 17, 1995, p. E3; Arturo Zampaglione, "Italy Blocks Stealth Fighters," *La Repubblica*, September 12, 1995, p. 7, translated in Foreign Broadcast Information Service, *Daily Report: West Europe*, FBIS-WEU-95-176, September 12, 1995, p. 20; News broadcast by RAI Uno Television Network, September 12, 1995, in FBIS-WEU-95-177, September 13, 1995, p. 15; Italian Foreign Minister Susanna Agnelli, remarks in "Much as I Love America, There Was Nothing Else I Could Do" (interview), *La Stampa*, September 14, 1995, p. 5, in FBIS-WEU-95-179, September 15, 1995, pp. 16-17.

115. Adm. William A. Owens, USN, *High Seas: The Naval Passage to an Uncharted World* (Annapolis, MD: Naval Institute Press, 1995), p. 62.

116. Reuters News Agency, December 31, 1995.

ground assaults.¹¹⁷ In the HBFS analysis, U.S. in-theater buildups for the two MRCs take place without interference. (In the excursions, enemy attacks on bases occur before each buildup or after each war begins.) Attacks could take place *as* and not, as the HBFS assumes, *after* U.S. forces deploy to the theater. Surely one of the lessons any potential adversary drew from the Gulf War is that it would be a mistake to let the United States freely amass military forces near its borders prior to a conflict. Rather, the adversary might take military action to disrupt the forward deployment of U.S. forces, including tactical aircraft. In this regard, the Chairman of the Joint Chiefs of Staff has warned that, "we would expect that [Iraqi] military planners have learned the lessons from the [Gulf] war as well. We should not expect to have six months of unopposed deployment buildup time in the future, and we expect Iraq would use its armored and air forces more efficiently than in 1990."¹¹⁸ (Though evident to enemies, these lessons were not incorporated fully into the design of the HBFS.) The same danger would be present in MRC-West, as a recent DoD report makes clear:

...North Korea will likely try to consolidate and control strategic areas of South Korea by striking quickly and attempting to destroy allied defenses before the United States can provide adequate reinforcements. Pyongyang hopes to do this with its large conventional force and its chemical weapons and ballistic missiles complement.

...Over the years, Pyongyang has worked to improve its capability to launch a surprise attack against South Korea. With the right conditions, or the perception of the right conditions, Pyongyang could launch an attack supported by chemical weapons and SCUD missiles against any military or civilian targets in South Korea, including key logistics facilities in Pusan, Taegu, and Kwangju.¹¹⁹

Likewise, threats from enemy mines, antiship missiles, and strike aircraft could keep "floating air bases" (aircraft carriers) at risk and at a distance from unfriendly coastlines, at least initially, decreasing the effective operating ranges and sortie rates of their aircraft. It was, in fact, due partly to such threats that carriers did not move into the northern Persian Gulf until nearly a month after the Gulf War began.¹²⁰

The Senate Armed Services Committee explicitly requested that the HBFS "pay particular attention to assumptions about the length of time required to establish full

117. See Patrick J. Garrity, *Why the Gulf War Still Matters: Foreign Perspectives on the War and the Future of International Security*, Report No. 16 (Los Alamos, NM: Center for National Security Studies, Los Alamos National Laboratory, July 1993), pp. 95, 97, 101; David A. Shlapak and Alan Vick, "Check Six Begins on the Ground": Responding to the Evolving Ground Threat to U.S. Air Force Bases, MR-606-AF (Santa Monica, CA: RAND Corp., 1995); Alan Vick, *Snakes in the Eagle's Nest: A History of Ground Attacks on Air Bases*, MR-553-AF (Santa Monica, CA: RAND Corp., 1995).

118. Shalikhshvili, submission for the record, Senate Appropriations Committee, Hearings, Department of Defense Appropriations for Fiscal Year 1995, Part 1, 103d Cong., 2d sess. (Washington, DC: GPO, 1994), p. 169.

119. Office of the Secretary of Defense, *Proliferation: Threat and Response* (Washington, DC: GPO, April 1996), p. 4. See also Defense Intelligence Agency, *North Korea: The Foundations for Military Strength—Update 1995*, FC-1510-101-96 (Washington, DC: DIA, March 1996), pp. 12, 21, 23-24; "North Korea Wouldn't Invade the South, Would It?"

120. James A. Winnefeld, Preston Niblack, and Dana J. Johnson, *A League of Airmen: U.S. Air Power in the Gulf War*, MR-343-AF (Santa Monica, CA: RAND Corp., 1994), p. 266; GWAPS, Vol. II, Pt. II, pp. 229-230.

supply lines to theater-based forces *in the presence of a theater ballistic missile threat*."¹²¹ All forecasts indicate the further proliferation of WMD, ballistic missiles, and cruise missiles during the next twenty years. Given that future ballistic missiles deployed by regional powers may have ranges of 500 nautical miles (nm) or more, tactical aircraft, with unrefueled combat radii in that neighborhood, very well could be vulnerable to military strikes on their bases.¹²² Tactical aircraft could seek the refuge of bases farther from hostile territory—and enemy missile launchers—but these bases might be too faraway or inaccessible. Moreover, the added flight distance could stretch planned capabilities for aerial refueling, which, for the next quarter century or more, will fall short of anticipated wartime requirements.¹²³

U.S. decisionmakers, like foreign leaders, may be reluctant to authorize the deployment of forces to bases that are under the shadow of WMD. This possibility was brought out in a series of political-military exercises conducted by the RAND Corporation in 1992 and 1993. The exercises included scenarios in which the United States intervened against a nuclear-armed Iran in order to defend Kuwait and Saudi Arabia, and confronted a North Korean invasion of South Korea that involved the use of tactical nuclear weapons against South Korean forces. Military officers, government officials, congressional staff members, and policy analysts were among the exercise participants. According to the report on the exercises,

Participants' reactions to [the Middle East] exercise suggest that the proliferation of small nuclear forces...poses a serious threat to U.S. security objectives and military operations in regions of vital interest. The acquisition of a small number of nuclear weapons by regional adversaries caused deep divisions among the participants on the advisability of deploying substantial numbers of U.S. forces to the theater in crisis. This made problematic U.S. strategies designed to achieve victory by an overwhelming military force and called into question the possibilities for decisive victory, the likelihood of minimum U.S. casualties, and the prospects of a quick war.

...In a pattern similar to the [Middle East exercise], many participants [in the Korean exercise] were reluctant to deploy ground forces to South Korea....¹²⁴

Deterrence and active defenses, it should be noted, may be inadequate to protect forward-deployed forces and allied populations from missile attacks or to reassure decisionmakers concerned about their safety. The "simple threat of retaliation," the Secretary of Defense has said, "may not be enough to deter some rogue nations or

121. SASC FY 95 Report, p. 58 (emphasis added). In some excursions for the HBFS, mining by the enemy "forced the carriers to operate from greater distances offshore until the mines were cleared." Kaminski, submission for the record, SASC FY 96, Pt. 7, p. 422.

122. *Proliferation: Threat and Response*; Commission on Roles and Missions, "Future Bomber Force," Draft Staff Paper, 1995.

123. According to the Air Force Scientific Advisory Board, air refueling capabilities programmed through 2020 will be 14 percent below the total air refueling requirement entailed by the scenarios of the *Defense Planning Guidance for Fiscal 1996-2001*. See United States Air Force Scientific Advisory Board, *New World Vistas: Air and Space Power for the 21st Century, Mobility Volume* (Washington, DC: USAF SAB, 1996), p. 7.

124. Marc Dean Millot, Roger Molander, and Peter A. Wilson, "The Day After..." Study: *Nuclear Proliferation in the Post-Cold War World*, Vol. II: Main Report, MR-253-AF (Santa Monica, CA: RAND Corp., 1993), pp. 63, 102.

terrorists from using...weapons [of mass destruction]."¹²⁵ And, to cite the truism recently repeated by the head of Central Command, the designated commander for MRC-East, "Missile defenses may not be leakproof."¹²⁶

In recognition of the WMD threat to overseas bases, the HBFS *assumes* that in the event of chemical attacks on air bases, sorties from those bases would be reduced by two-thirds during the first week of operations, one-half during the second week, and one-third during the third week.¹²⁷ In reality, the possible reduction in sorties flown is highly uncertain and could be more severe.¹²⁸ Moreover, the effects of attacks involving other WMD apparently were not examined.¹²⁹ A nuclear attack, in particular, would obliterate rather than temporarily shut down a base. This apparent neglect of the biological and nuclear threats to overseas airfields is at odds with warnings in a recent DoD report on proliferation,¹³⁰ as well as non-HBFS analytic work done by the Institute for Defense Analyses, which concluded that "maintaining an allied intervention capability—one which an opponent cannot stop with modest numbers of nuclear strikes against logistics and infrastructure targets—will be an expensive undertaking."¹³¹ It should be noted that although the HBFS accounts for aircraft lost to enemy air defenses, it apparently does not include losses caused by attacks on air bases.

The campaigns planned for the two-MRC baseline case of the HBFS could not be waged without in-theater bases. Tactical strike aircraft, which represent the bulk of the air power used in the campaigns, would be unavailable. Fewer in-theater bases would mean a much greater need for a larger force of heavy bombers. With their intercontinental range, bombers could operate from bases outside the reach of enemy missiles, including, if necessary, home bases in the continental United States (CONUS). Note that in Operation Desert Storm, three-quarters of the 75 B-52s that participated in the air campaign operated from bases 1,700 to 2,000 nm from the theater, and on one mission, seven bombers flew from CONUS and back to deliver conventional cruise missiles against Iraq.¹³² In comparison, Iraqi Scuds had ranges of less than 350 nm.¹³³ The briefings on the HBFS point out the need for forward basing of bombers in the "No

125. Ferry, "Weapons of Mass Destruction," p. 3. For an extended discussion of this proposition, see Keith B. Payne, *Deterrence in the Second Nuclear Age* (Lexington, KY: University Press of Kentucky, forthcoming October 1996).

126. Peay, Prepared statement before the Senate Armed Services Committee, p. 28.

127. Kaminski, in SASC FY 96, Pt. 7, p. 362.

128. Maj. Gen. Jasper A. Welch, Jr., USAF (Ret.), in SASC FY 96, Pt. 7, p. 399.

129. Dicks, in HAC FY 96, Pt. 4, p. 319.

130. *Proliferation: Threat and Response*, pp. A-1 - A-2, A-5.

131. Institute for Defense Analyses, *1994 Annual Report* (Alexandria, VA: IDA, n.d.), p. 28.

132. Department of Defense comments, in General Accounting Office, *Strategic Bombers: Adding Conventional Capabilities Will Be Complex, Time-Consuming, and Costly*, GAO/NSIAD-93-45 (Washington, DC: GAO, February 1993), p. 53.

133. *Proliferation: Threat and Response*, p. 23.

Strike TACAIR" case,¹³⁴ but fail to mention that these bases would not necessarily be in the theater, unlike those for tactical strike aircraft.

Questionable Deployments of Combat Aircraft

The HBFS makes three debatable assumptions about the wartime deployments of U.S. aircraft. First, fighters will be present to protect nonstealthy bombers, even in conflicts where warning time is short, air bases are denied, and aircraft carriers are out of position. Second, tactical aircraft will deploy to Northeast and Southwest Asia with unprecedented rapidity. And third, bombers quickly and easily will redeploy from MRC-West to MRC-East before the start of the second conflict and the end of the first. The validity of these assumptions is examined below.

In the "No Strike TACAIR" case, older bombers (B-52Hs and B-1Bs) are provided with approximately one wing of fighter escorts. While these aircraft today are available in Northeast Asia and the Persian Gulf region,¹³⁵ they might not be in the future. If still present, their bases could be vulnerable to attack. For other contingencies, escorts might be absent. In addition, the presence of a fighter wing is inconsistent with the assumption that no tactical strike aircraft are in the theater. What peculiar circumstances would permit the deployment of, for example, F-15C fighter aircraft, but not F-15E fighter-attack aircraft? The study should have analyzed a true "No TACAIR" case that excluded fighter as well as strike aircraft.

Fighter protection for the B-52H and B-1B bombers has the effect of obscuring the edge the B-2 enjoys over these aircraft by virtue of its stealth characteristics. Unlike the other bombers, the stealthy B-2 has the ability to operate autonomously throughout hostile airspace. Dependence on escorts would limit the older bombers to targets within the shorter combat radii of the fighters, thereby depreciating one of the distinguishing operational advantages of the long-range aircraft. The considerable cost of fighter cover for the B-52Hs and B-1Bs—around \$800 million per wing per year¹³⁶—was not included in the calculation by which B-1B upgrades were judged more cost-effective than procurement of additional B-2s.¹³⁷ (This despite the fact that the Senate Appropriations Committee, in requesting the HBFS, stipulated that the costs of fighter escorts and electronic warfare aircraft should be taken into account.)¹³⁸ Even with escorts, however, the older bombers might remain vulnerable to enemy air defenses in the first weeks of a

134. Kaminski, in *HAC FY 96, Pt. 4*, pp. 342, 359.

135. *DoD Report for 1996*, p. 13; Michael Collins Dunn, "Watch on the Gulf," *Air Force Magazine*, Vol. 78, No. 4 (April 1995), pp. 60-64.

136. Lockheed Analytical Group, *Military Force Structure Planning Study* (Lockheed, 1994). This figure includes annualized procurement costs, direct operation and support spending, and an allocated share of variable infrastructure expenditures for a land-based tactical fighter wing. The similar cost for a carrier air wing and its carrier battle group is \$2.6 billion. These costs are in FY 95 dollars.

137. Welch, in *SAC FY 96, Pt. 7*, p. 403.

138. *SAC FY 95 Report*, pp. 186-187.

conflict.¹³⁹ If vulnerable without fighter support, nonstealthy bombers might be restricted to launching limited numbers of stand-off weapons, which are many times the cost of direct-attack munitions, and less effective in delivering antiarmor submunitions. Or they simply might be incapable of conducting missions in the initial stages of a conflict. In his testimony before the Senate Armed Services Committee, Dr. Kaminski acknowledged the importance of the fighter escorts to the results of the study. He told the committee that if this protection for the older bombers were unavailable, "We would probably be talking about a *few hundred* additional B-2s because of constraints on using the B-1s and the B-52s in the arrangement" for the "No Strike TACAIR" case.¹⁴⁰

The analysis in the HBFS also is based on unrealistic deployment schedules for tactical aircraft. In MRC-East, for example, more tactical aircraft arrive in the theater more quickly than was true in either Desert Shield or Vigilant Warrior. In the bomber study, 500 fighter aircraft are in the theater one week after deployment operations for U.S. forces commence.¹⁴¹ After 14 days, at the time war begins, 800 aircraft and two carrier battle groups are in place. In the real world, things move at a much slower pace. One week after the start of Desert Shield, two carrier battle groups were on station, but only around 200 fighter and attack aircraft were in the theater, less than half what the HBFS assumes. A week later, three carrier battle groups and more than 400 aircraft were present, the number of aircraft, again, only about half the size of the force deployed in the 14-day buildup for the mock MRC.¹⁴² In the simulated conflict, then, the United States deploys roughly twice the number of tactical aircraft that actually were sent to the Persian Gulf region during the comparable period of Desert Shield.

A similar discrepancy is evident when deployment rates for Vigilant Warrior and MRC-East are compared. In early October 1994, two Republican Guard armored divisions left garrisons near Baghdad to join six other divisions located in southern Iraq. Lead brigades of the overall force of more than 64,000 troops were less than an hour's drive from Kuwait.¹⁴³ Fearing another Iraqi invasion, the United States began sending additional air, naval, and ground units to the Persian Gulf region. A week after these deployments were ordered, around 130 land-based combat or combat support aircraft and a carrier with some 60 fighter and attack aircraft had arrived in the theater to augment the 70 U.S. aircraft already in Saudi Arabia.¹⁴⁴ The total was far less than the 500 aircraft projected in the HBFS. By the end of the second week, when 800 aircraft are ready for MRC-East, fewer than 350 land- and sea-based tactical aircraft had been

139. Loh, in *SASC FY 96*, Pt. 7, p. 391.

140. *SASC FY 96*, Pt. 7, p. 355 (emphasis added).

141. Nunn, in *SASC FY 96*, Pt. 7, p. 345.

142. *GWAPS*, Vol. V, Part I: *A Statistical Compendium*, p. 53; *Conduct of the Persian Gulf War*, p. 386; David A. Perrin, *Reflections on the Gulf War: The August Nightmare That Could Happen Next Time* (Alexandria, VA: Center for Naval Analyses, May 1992), p. 3.

143. "The Five Pillars of Peace in the Central Region," p. 32; Perry, Address to the Middle East Policy Council, December 7, 1994 (photocopy), pp. 4-5; Lt. Gen. John Sheehan, Director, J-3, Organization of the Joint Chiefs of Staff, DoD Press Briefing, October 8, 1994 (transcript provided by the Office of the Secretary of Defense/Public Affairs), pp. 3-4.

144. Perry, Address to the Middle East Policy Council, pp. 6-7; Chris Hedges, "Kuwait Troops Vow To Fight This Time," *New York Times*, October 11, 1994, p. A12.

deployed in Vigilant Warrior.¹⁴⁵ A second carrier battle group was still two weeks away.¹⁴⁶ And against the Iraqi host, fewer than 10,000 U.S. combat troops (elements of an Army mechanized infantry division and a Marine Expeditionary Unit) had reached the theater.¹⁴⁷ Officials nonetheless characterized Vigilant Warrior, with justification, as a "swift and efficient" dispatch of "large-scale forces" to meet the Iraqi threat.¹⁴⁸ It was not, however, nearly as swift nor as large as the projection of tactical air power assumed in the HBFS. The realities of Vigilant Warrior apparently had little influence on the timetables used in the HBFS.

It might be added that most of the forces participating in Vigilant Warrior arrived after the date an invasion seemed most likely, which coincided with the third or fourth day of the U.S. operation.¹⁴⁹ While these forces were not slated to reach the theater for days or weeks, heavy bombers were on alert from the outset of the crisis, and as a high-ranking military officer pointed out, within hours "could have deployed right...from CONUS and conducted their missions" against Iraq.¹⁵⁰ This was demonstrated shortly after the crisis ended, when two B-1Bs and two B-52Hs on nonstop missions from bases in the Dakotas dropped over 50,000 pounds of ordnance on abandoned tanks and armored vehicles at a bombing range in Kuwait just 15 km from the Iraqi border.¹⁵¹

Various factors raise doubts about the timely deployment of tactical aircraft and other forces to overseas theaters. WMD attacks could close in-theater air bases designated to receive U.S. aircraft. The HBFS does not, as mentioned earlier, consider nuclear or biological attacks on air bases. Nor does it explicitly model missile strikes on these facilities.¹⁵² If deployments are not postponed or precluded by attacks on bases, the units that arrive still may be ill-prepared for sustained combat because of inadequacies in logistics support for rapidly deployed expeditionary forces.

With carrier presence in critical regions diminished since the end of the Cold War, and carrier transit times measured in weeks, the required number of sea-based tactical

145. "The Five Pillars of Peace in the Central Region," p. 32.

146. "Senior military official," Background Briefing on Iraq, October 20, 1994 (transcript provided by the Office of the Secretary of Defense/Public Affairs), p. 5.

147. Dennis Boxx, Deputy Assistant to the Secretary of Defense for Public Affairs (Information), DoD Press Briefing, October 18, 1994 (photocopy), p. 6; "Senior military official," Background Briefing on Iraq, pp. 3, 4, 5.

148. The White House, *A National Security Strategy of Engagement and Enlargement* (Washington, DC: GPO, February 1995), pp. iii, 3. See also DoD Report for 1995, pp. 15, 29; Peay, Prepared statement before the House National Security Committee, February 23, 1995 (photocopy), pp. 16-17.

149. President Clinton ordered the reinforcement of U.S. forces in the region on October 6 (Perry, Address to the Middle East Policy Council, p. 5). October 9-10 was considered the height of the crisis ("Military officials," cited in John J. Fialka, "U.S. Cuts Back on Its Forces Headed to the Gulf," *Wall Street Journal*, October 21, 1994, p. A16). The threat of war had passed by October 15 (Perry, remarks quoted in Michael R. Gordon, "Perry Reports Elite Iraq Army Is Set to Retreat," *New York Times*, October 16, 1994, p. A1).

150. Quotation is from "senior military official," Background Briefing on Iraq, p. 6. See also Lt. Gen. John Jumper, Commander of Joint Task Force Southwest Asia, quoted in David A. Fulghum, "Iraqi Invasion Threat Reassessed by Military," *Aviation Week & Space Technology*, Vol. 141, No. 20 (November 14, 1994), p. 19.

151. Office of Public Affairs, Headquarters Air Combat Command, "Bombers Drop Live Weapons in Kuwait," *News Release No. 94-11-01*, November 1, 1994; "B-1s, B-52s Conduct Kuwait Bombing Exercise," *Aviation Week & Space Technology*, Vol. 141, No. 19 (November 7, 1994), p. 29; William B. Scott, "B-1B Demonstrates Global Reach," *AIW&ST*, Vol. 141, No. 20 (November 14, 1994), pp. 21-22.

152. Nunn, questions for the record; Kaminski, responses for the record, in SASC FY 96, Pt. 7, pp. 426-427.

strike aircraft may not be in the theater when needed. The present fleet of 12 carriers (11 active and one reserve) is too small to maintain the continuous presence of one carrier battle group in each of three regions—the western Pacific Ocean, the Mediterranean Sea, and the Indian Ocean/Arabian Sea.¹⁵³ In the event of a single MRC, it would take up to six weeks before four carrier battle groups were on station, and up to nine weeks for the deployment of five carriers and their escort ships. A full complement of five carrier air wings would not be in place for four to seven weeks after the start of a major regional conflict, even assuming carrier redeployments were ordered immediately in response to strategic warning.¹⁵⁴

Lengthy deployment times would reduce the ability of tactical strike aircraft to counter an invasion promptly. And, as the chief architect of the BUR once argued, an invasion must be halted early on because,

...the sooner we stop the invasion, the less likely will be the capture of critical facilities such as ports, oil fields or our ally's capital.

...if the invasion is not stopped quickly, our ally might be driven to surrender, greatly complicating efforts to oppose the aggressor.

And [as] war games and analysis repeatedly show, the more progress the enemy makes, the more territory he captures, the greater the price to take it back. The number of divisions required for the counteroffensive to repel an invasion can increase two- or threefold, with correspondingly increasing casualties, depending on the progress the invader makes.¹⁵⁵

In contrast, heavy bombers operating from CONUS, or from bases between CONUS and the theater, could strike powerful blows against the enemy from the outset of the conflict.

The HBFS makes similarly questionable assumptions about the ease with which a large portion of the bomber force could be swung from one MRC to the other. While the HBFS was in progress, the Commander of Air Combat Command warned that swinging bombers would carry "substantial risks."¹⁵⁶ The swing between MRCs is not a preferred approach for employing the bomber force, but the unavoidable consequence of programming a force of less than 200 bombers when 100 are needed for each MRC. The planned bomber force is the minimum necessary to swing.¹⁵⁷ Bombers are the only major

153. General Accounting Office, *Navy Carrier Battle Groups: The Structure and Affordability of the Future Force*, GAO/NSIAD-93-74 (Washington, DC: GAO, February 1993), p. 25. See also Maj. Gen. Marvin T. Hopgood, Jr., Director of Operations, Pacific Command, submission for the record, House National Security Committee, Hearings, *National Defense Authorization Act for Fiscal Year 1996*, HNSC No. 104-6 (Washington, DC: GPO, 1995), p. 319.

154. Department of the Navy, submission for the record, *An Assessment of the Bottom-Up Review*, p. 106.

155. Les Aspin, Remarks at the National Defense University Graduation, *Department of Defense News Release No. 281-93*, June 16, 1993, p. 2.

156. Loh, Address to the Air Force Association Annual Conference, February 23, 1995, quoted in "Bottom-Up Review Strategy Contains Substantial Risk."

157. Secretary of the Air Force Shelia Widnall and Gen. Ronald R. Fogleman, Air Force Chief of Staff, "FY 97 Air Force Budget Overview," Prepared statement before the House Appropriations Committee, March 1996 (photocopy), p. 19.

force element that must shift from the first conflict to the second, suggesting an imbalance in the BUR force structure (but also underscoring the strategic agility of bombers).

Swinging bombers in wartime from one side of the globe to the other would be a strategic maneuver without precedent. In World War II, the last multitheater "contingency," a single medium bomber group—no heavy bombers—slowly redeployed, via CONUS, from Europe to the Pacific theater.¹⁵⁸ In the two-MRC scenario, there might be serious problems in lifting tons of associated support and logistics cargo, as well as thousands of personnel needed by the swinging bombers.¹⁵⁹ In addition, aircrews swinging from one conflict to the next might be taxed to the breaking point.¹⁶⁰ A shortage of aircrews will exacerbate this problem. Planning for the two MRCs calls for a wartime aircrew-to-bomber ratio of 2.0.¹⁶¹ But current and projected crew ratios are more like 1.3.¹⁶² To bridge this gap and sustain a high operations tempo in wartime, crews would need to spend much more time flying combat missions. Consequently, crews assigned to swing could be severely fatigued by the time they reached the second conflict.

Truly simultaneous (not "nearly simultaneous") MRCs also could disrupt the planned swing. The MRCs in the HBFS are not really "nearly simultaneous." The second MRC does not break out until preparations for a counterattack in the first are well under way. This enables bombers to deal with time-critical targets in the initial conflict before redeploying to attack similar targets in the other war. In the real world, the second aggressor might move more quickly to gain military advantage. As with the assumption regarding warning, the war-fighting commands believe "the separation time between the two conflicts [is] likely to be shorter than DoD envisions."¹⁶³ According to one of the principal authors of the BUR, the separation time built into the two-MRC scenario is "not based on a specific intelligence estimate," but is "simply arbitrary."¹⁶⁴ Despite their speed, bombers cannot be in two places at once. Conflicts that were coincident, by the logic of the BUR and HBFS, would imply a larger bomber force because sequential deployments of the same aircraft might be infeasible. Even if, as DoD assumes, the starts of the two

158. Wesley Frank Craven and James Lea Cate, eds., *The Army Air Forces in World War II, Vol. VII: Services Around the World* (Chicago, IL: University of Chicago Press, 1958) (new imprint by the Office of Air Force History, 1983), pp. 545, 549, 554, 555, 557-558, 561-562, 564-566, 572.

159. Loh, in SASC FY 96, Pt. 7, pp. 379, 383, 391; Loh, in HAC FY 96, Pt. 4, pp. 385-386, 399, 400.

160. Loh, in HAC FY 96, Pt. 4, p. 399; Loh, in SASC FY 96, Pt. 7, p. 383.

161. Rudy de Leon, Under Secretary of the Air Force-designate, submission for the record, Senate Armed Services Committee, Hearings, *Nominations before the Senate Armed Services Committee, Second Session, 103d Congress, 103d Cong., 2d sess.* (Washington, DC: GPO, 1994), p. 547; Loh, "ACC Commander's Briefing," in Strategic Assessment Center, Science Applications International Corp., *The US Air Force Roundtable on the Revolution in Military Affairs* (McLean, VA: SAJC, January 1994), briefing slide titled "Bomber Force - 101."

162. Loh, submission for the record, House Appropriations Committee, Hearings, *Department of Defense Appropriations for 1995, Part 3, 103d Cong., 2d sess.* (Washington, DC: GPO, 1994), p. 707.

163. *Bottom-Up Review: Analysis of Key DoD Assumptions*, p. 41.

164. Edward L. Warner III, Assistant Secretary of Defense for Strategy and Resources, in SASC FY 95, Pt. 1, p. 708.

wars were separated by several weeks, unanticipated exigencies in the first might prevent the swing altogether.

If more detailed analysis and future training and exercises demonstrate that the swing maneuver could not be executed smoothly, then the number of bombers required for the two-MRC strategy has been underestimated and more B-2s would be needed. Thirty to forty more bombers than the number endorsed by the HBFS might be needed so that the bomber force would not be unduly stretched in the two-MRC scenario.¹⁶⁵ Improving the capabilities of the aircraft in the planned force—the course recommended in the bomber study—would do little to remedy swing problems, which result from a deficit in numbers.

Poor Analytic Yardsticks

In the briefings on the HBFS, bombers and other forces are not evaluated with regard to the campaign objectives of the two MRCs, which are never clearly defined. Instead, a set of three dubious standards is used to gauge the military worth of the different bomber options. The first, FLOT movement, is closely tied to the particular type of conflict represented by the MRCs: a war in which a cross-border invasion of allied territory by an army with thousands of tanks and armored fighting vehicles is repulsed by U.S. and allied counterattacks. FLOT movement is less applicable as a measure of effectiveness for other conflicts, past and possible. The Vietnam War, for example, was largely a guerrilla conflict without a fixed front.¹⁶⁶ The FLOT yardstick also would have been of little use in appraising Coalition success in ejecting the Iraqi army from Kuwait during the Gulf War. B-52 bombers made valuable contributions to U.S. military efforts in both conflicts, even though they cannot be measured by FLOT changes. Similarly, the support to diplomatic efforts rendered by NATO air strikes in Operation Deliberate Force was not a matter of fluctuations in a FLOT.¹⁶⁷ Shortly before the HBFS was completed, General Gordon Sullivan, then Army Chief of Staff, suggested that future conflicts as well could not be understood in terms of shifts in a FLOT.¹⁶⁸ Just as the two-MRC scenario is limited in conflict type and bomber applications, so too is FLOT movement a specialized metric. It would not be an appropriate measure of effectiveness for any bomber operation that did not involve attacks to halt a ground offensive (for example, a strategic air campaign against vital political, economic, and military targets deep in an enemy's homeland).

165. Loh, in *HAC FY 96*, Pt. 4, p. 397.

166. See Thomas C. Thayer, *War Without Fronts: The American Experience in Vietnam* (Boulder, CO: Westview Press, 1985).

167. On Deliberate Force, see Rick Atkinson, "Air Assault Set Stage for Broader Role," *Washington Post*, November 15, 1995, p. A1; Atkinson, "In Almost Losing Its Resolve, NATO Alliance Found Itself," *Washington Post*, November 16, 1995, p. A1; Craig Covault, "Air Power Alters Bosnia Equation," *Aviation Week & Space Technology*, Vol. 143, No. 10 (September 4, 1995), pp. 22-24; Covault, "NATO Air Strikes Target Serbian Infrastructure," *AW&ST*, Vol. 143, No. 11 (September 11, 1995), pp. 27-28; Covault, "Precision Missiles Bolster NATO Strikes," *AW&ST*, Vol. 143, No. 12 (September 18, 1995), pp. 22-23; John D. Morrocco, "Bombing Campaign Seen Withdrawing," *AW&ST*, Vol. 143, No. 13 (September 21, 1995), p. 36.

168. Cited by Welch, in *SASC FY 96*, Pt. 7, p. 399.

Yet even in the context of the artificial MRCs in the HBFS, FLOT movement is not a reliable criterion for rating alternative bomber forces. As defined in the study, FLOT movement is "depth of penetration by opposing forces during initial halting phase."¹⁶⁹ Depth of penetration is a function of the rate of advance of enemy ground forces, that is, how far forward armored, mechanized, or infantry units move during a specified period. A few years ago, a study of rates of advance was done by the Special Assistant for Model Validation at the Army Concepts Analysis Agency. Key empirical works on the subject were critically reviewed and independent statistical analysis also was performed. A range of possible determinants of rates of advance was examined, including the size of the unit, the speed of the mode of transport, the season (summer or winter), the duration of the operation, the degree to which the unit engaged in combat, and the force ratio between friendly and enemy forces. The study concluded that,

Both this and past efforts to devise consistently accurate schemes for predicting advance rates have been unsuccessful. ...Rates of advance are not consistently or accurately predictable by current knowledge. ...at this point we must seriously consider the possibility that advance rates are largely due to inherently uncontrollable chance events.¹⁷⁰

The results of computer runs that calculate a conflict variable that in the real world is essentially unpredictable because of its dependence on "inherently uncontrollable chance events" hardly constitute a firm basis for making a major defense investment decision.

The second measure of performance—number of aircraft lost—is no better. Prewar attrition estimates can be extremely inaccurate. Consider estimates made before the start of the Desert Storm air campaign. An Air Force analysis, summarized for the President by the Chief of Staff, predicted that during a 30-day, 30,000-sortie campaign preceding ground combat, 150 aircraft would be downed, making for an attrition rate of .005 losses per sortie.¹⁷¹ In the actual campaign, fighter and strike aircraft flew some 69,000 sorties over 40-odd days, with 38 aircraft downed by hostile action, resulting in a rate of .00055 losses per sortie.¹⁷² The "number of aircraft lost" prediction in this case was off (fortunately) by an order of magnitude.

Number of aircraft lost, like number of sorties required, the third yardstick, in a sense measures the efficiency of air operations, not the success of forces in meeting their objectives. If the United States resolves to wage war to defend an ally or economically valuable region in which it has a vital interest, minimizing attrition will be of secondary

169. Kaminski, in *HACFY 96*, Pt. 4, p. 358.

170. Robert L. Helmbold, *Rates of Advance in Historical Land Operations*, CAA-RP-90-1 (Bethesda, MD: U.S. Army Concepts Analysis Agency, June 1990), p. 1-4. See also a companion report, Helmbold, *A Survey of Past Work on Rates of Advance in Land Combat Operations*, CAA-RP-90-03 (Bethesda, MD: U.S. Army Concepts Analysis Agency, February 1990).

171. Department of the Air Force, *Reaching Globally, Reaching Powerfully: The United States Air Force in the Gulf War* (Washington, DC: Department of the Air Force, September 1991), p. 34; Bob Woodward, *The Commanders* (New York: Simon & Schuster, 1991), p. 340.

172. *GWAPS*, Vol. II, Pt. II, pp. 114-115.

concern in comparison to winning the conflict. Nonetheless, the theater commander and his air component commander would not simply set an offensive in motion and let losses mount. Rather, they would strike a balance between losses incurred and aims achieved and take steps to reduce attrition through some combination of changes in tactics, targets, and operational objectives.¹⁷³ Just how they would manage attrition, and with what outcome cannot be predicted by computer simulations.

The HBFS neglects alternative, but important measures of effectiveness, such as the percentage of targets in different categories destroyed at certain points over the course of a strategic air campaign or the number of casualties suffered.¹⁷⁴ Yet the guidance for the HBFS gave "[time needed] to attack a specified percentage of critical targets" as one of the measures for assessing the effectiveness of bomber force options.¹⁷⁵ Different yardsticks, other than the three geared to the canonical two-MRC scenario, could shed more light on the military worth of heavy bombers. Flimsy numbers for FLOT movement, aircraft lost, and sorties flown offer a weak foundation for deciding the future structure of the bomber force.

Skewed Comparison of a Small Bomber Force with a Large Tacair Force

In the baseline case of the bomber study, an armada of tactical aircraft is deployed to each theater prior to hostilities. In this case, adding 20 more B-2s to the planned bomber force barely registers on the FLOT, losses, and sorties meters. But this is to be expected. Comparing the attack capabilities of tens of bombers with those of over 1,000 tactical aircraft (per MRC)¹⁷⁶ necessarily conceals the distinctive attributes of bombers and the unique roles they can play in winning wars. As Dr. Kaminski admits, "If you look at all the tactical air...involved in this [regional conflict] scenario, we have more than 10 times more tactical aircraft than bombers. ...After everything has arrived, the bomber results get lost in this overall aggregate."¹⁷⁷ The study compounds the disparity by using bomber sortie rates that are lower than those achieved in Desert Storm, while using sortie rates for tactical aircraft that are much higher.¹⁷⁸

173. Welch, in *SASC FY 96*, Pt. 7, p. 401. See also Memo from Maj. Gen. Charles D. Link, Air Force Assistant Deputy Chief of Staff for Plans and Operations, to Director J-8, Under Secretary of Defense (Dir. Investment), Assistant Secretary of Defense (S&R), et al., subj: Deep Attack Weapons Mix Study (DAWMS) Process Issues, May 20, 1996, reprinted in "Senior Official Raps Methodology in Attack Weapons Mix Study."

174. Loh, in *SASC FY 96*, Pt. 7, p. 415.

175. Deutch memo to Secretaries of the Military Departments, et al.

176. 10 Air Force fighter-wing equivalents x 72 aircraft per wing equivalent = 720 aircraft; 4-5 Navy air wings (one wing per carrier battle group) x 50 aircraft per wing = 200-250 aircraft; 1-2 Marine air wings (one wing per Marine Expeditionary Force) x 144 aircraft per wing = 144-288 aircraft; 720 + 200-250 + 144-288 = 1,064-1,258 tactical aircraft per MRC. Sources for the size of each type of wing: *DoD Report for 1995*, pp. 199, 202; *DoD Report for 1996*, pp. 169, 171; Gen. Merrill A. McPeak, *Presentation to the Commission on Roles and Missions of the Armed Forces* (Washington, DC: GPO, 1994), p. 67.

177. *DoD Special Briefing*, pp. 6, 7. See also Kaminski, in *SASC FY 96*, Pt. 7, p. 416; George E. Koleszar, Institute for Defense Analyses, in *SASC FY 96*, Pt. 7, p. 377; Bell, Press Briefing, p. 3.

178. Welch, in *SASC FY 96*, Pt. 7, p. 420.

With the same flawed analytic approach, the negligible value of a carrier battle group could be demonstrated, given that the striking power of one B-2 wing (16 aircraft) by some calculations equals or exceeds that of a carrier air wing (with 50 strike-capable aircraft).¹⁷⁹ Less than a year before the HBFS began, the Air Force conducted a study that weighed the relative contributions of land- and sea-based air power to allied victory in a Korean conflict. The analysis shows that once the full land-based air complement is in place, the contribution of carrier aircraft is "marginal." Significantly, one of the measures of effectiveness is the extent of "enemy penetration into friendly country" (recall that "depth of penetration by opposing forces during initial halting phase" is the way FLOT movement is defined in the HBFS). With land-based air power alone, the North Korean army is held to a penetration of 58 km into South Korean territory. With the addition of either two or four carrier air wings, the result is essentially the same: a penetration of 57 km into friendly territory.¹⁸⁰ On the basis of these results, the considerable expenditure devoted to these forces (estimated at \$2.6 billion per carrier battle group per year)¹⁸¹ could be questioned, since it buys only a one-kilometer reduction in the depth of enemy penetration. Obviously this is the wrong way to judge the value of carriers and their aircraft. It also would be the wrong way to determine the need for more rather than fewer Joint Strike Fighters (the future fighter-attack aircraft planned to replace existing aircraft, like the F-16 and F-14). And it was the wrong way to assess the cost-effectiveness of more B-2s.

Aside from the advantage of sheer size, the force of tactical aircraft does well in the MRCs set in 2014 because it includes many new aircraft—the stealthy F-22 air-superiority fighter, the stealthy Joint Strike Fighter, and the Navy's F/A-18E/F fighter-attack aircraft.¹⁸² None of these aircraft has yet reached initial production. In the end, they may not be produced in the numbers currently planned. They also may fall short of their expected combat performance. Furthermore, while their expected effectiveness is counted in the HBFS, their cost, unlike that of the bomber options, is not.¹⁸³ The cost of modernizing tactical aviation will be many times the cost of upgrading or expanding the bomber force. Between now and 2014, the annual procurement cost alone for the new fighter and attack aircraft will average about \$8 billion (in constant dollars), for a total cost of roughly \$150 billion.¹⁸⁴ (In comparison, the total procurement cost for 20 additional B-2s is under \$20 billion.)¹⁸⁵ Thus much of the "overall aggregate" of combat power that B-2s and other bombers "get lost in" is cost-free.

179. See, for example, Col. Brian E. Wages, USAF (Ret.), "Circle the Carriers: Why Does 'Virtual Presence' Scare the Navy," *Armed Forces Journal International*, Vol. 132, No. 12 (July 1995), p. 28.

180. *Presentation to the Commission on Roles and Missions of the Armed Forces*, p. 80.

181. *Military Force Structure Planning Study*.

182. Koleszar, in *SASC FY 96*, Pt. 7, p. 377.

183. Welch, in *SASC FY 96*, Pt. 7, pp. 399, 420.

184. General Accounting Office, *Combat Air Power: Joint Mission Assessments Needed Before Making Program and Budget Decisions*, GAO/T-NSIAD-96-196 (Washington, DC: GAO, June 27, 1996), p. 12.

185. Kaminski, in *HAC FY 96*, Pt. 4, p. 564.

It is worth noting one other HBFS assumption that works to the disadvantage of the bomber mixes with more B-2s. In the study, the PGM inventory that supplies both tactical strike aircraft and heavy bombers is fixed at an inadequate size, even as the number of B-2s is increased. More B-2s do not deliver more PGMs, but merely deliver weapons other aircraft would have carried, leaving those aircraft to drop less-effective bombs. Alternatively, the B-2s are left with the less-effective weapons. Either way, the strike capability of the additional B-2s is not maximized and their effect on conflict outcomes is minimal. What should happen is an increase in the PGM inventory in order to arm the larger B-2 force without diverting weapons from the bomb bays and hardpoints of other aircraft.¹⁸⁶ Assuming an adequate stock of precision-guided munitions probably would have changed the study results.

Neglect of Peacetime Bomber Attrition

Aging and peacetime attrition of the bomber force are not taken into account in the HBFS.¹⁸⁷ By 2014, the heavy bomber fleet will be older than any other major force element.¹⁸⁸ The bomber study assumes B-52Hs will have a service life of unexampled length, remaining in the inventory through 2030,¹⁸⁹ almost 70 years after the last Stratofortress rolled off the assembly line. Air operations in peacetime entail the loss of some aircraft as a result of mechanical failure, human error, or natural events. While the study disregards attrition, Air Force planning factors suggest that 15 to 20 bombers will be lost in peacetime attrition between now and 2014.¹⁹⁰ When attrition is considered, the number of bombers required increases. Without a warm production line, bombers lost to peacetime attrition or in combat could not be replaced for future contingencies, conventional or nuclear. Air Combat Command has reported that "[t]o be able to execute the 2 MRC strategy," under the assumptions of the BUR, "we need about 184 bombers for combat and training alone. We need a few additional bombers for depot repair, test, and a modest number for attrition reserve to total around 209 bombers."¹⁹¹

No Trade-offs Between Additional Bombers and Other Force Elements

Trade-offs were specified in DoD guidance for the HBFS and also have been a matter of interest to members of Congress.¹⁹² Yet trade-offs were not done for more B-2s versus

186. Welch, in *SASC FY 96*, Pt. 7, pp. 398, 400-401. See also "Future Bomber Force," p. 2.

187. Department of Defense, submission for the record, *HAC FY 96*, Pt. 4, p. 404.

188. Don M. Snider, Daniel Gouré, and Stephen A. Cambone, *Defense in the Late 1990s: Avoiding the Train Wreck* (Washington, DC: Center for Strategic and International Studies, 1995), p. 9.

189. Kaminski, in *HAC FY 96*, Pt. 4, p. 340.

190. Dicks, in *HAC FY 96*, Pt. 4, p. 319; Loh, in *SASC FY 96*, Pt. 7, p. 394. See also the analysis, based on Air Force data, in Bernard C. Victory, *Future Peacetime Attrition of the Heavy Bomber Force* (Fairfax, VA: National Security Research, Inc., April 1996).

191. Loh, submission for the record, *HAC FY 96*, Pt. 4, p. 402.

192. Deutch memo to Secretaries of the Military Departments, et al.; Nunn, in *SASC FY 96*, Pt. 7, p. 387; Senate Armed Services Committee, *National Defense Authorization Act for Fiscal Years 1992 and 1993*, pp. 68-70.

tactical strike aircraft or more B-2s versus escorts and defense suppression aircraft required by nonstealthy strike aircraft. Nor did the Kaminski briefings discuss how the firepower of additional B-2s might substitute for that of Army units. As an example of "asymmetric attack," bomber operations against hostile ground forces, as compared with a symmetric ground defense, would exploit enemy weaknesses, reduce friendly casualties, and conserve resources.¹⁹³ The value of air power as an instrument of asymmetric attack was well-demonstrated by the 1,000-hour air campaign that enabled a 100-hour ground offensive in the Gulf War. In explaining the absence of such trade-offs in the HBFS, Dr. Kaminski commented that "trying to evaluate changing Army ground force composition in comparison with additional B-2s is a trade that our analysis tools fall shy of being able to do with any precision."¹⁹⁴ In addition, rather than trading off B-2s against other bombers and additional precision-guided munitions, all of which are highly effective combat capabilities, the study should have considered trade-offs with lower-priority reserve forces.

Trade-offs (for example, reducing the number of land-based tactical strike aircraft) are important because they could result in freeing up funds for more B-2s within fixed or declining defense budgets, and the creation of a more efficient force structure. As noted earlier, the controversy over the B-2 turns on cost, not capabilities. No high official questions the ability of the B-2 to perform its likely missions. What is questioned is the affordability of more B-2s within a constrained defense budget. The B-2 can be made affordable if it is substituted for less-effective strike capabilities.¹⁹⁵

193. Asymmetric engagements are endorsed in *Organization of the Joint Chiefs of Staff, Joint Warfare of the Armed Forces of the United States*, Joint Pub 1 (Washington, DC: GPO, January 10, 1995), pp. IV-10 - IV-12.

194. Kaminski, in *HAC FY 96, Pt. 4*, p. 395.

195. Some of these trade-offs were examined by the staff of the Commission on Roles and Missions. A number of the trade-offs favored more B-2s. See "Future Bomber Force."

Conclusion

An experienced defense analyst has observed that "defining the bounds of a problem is largely going to predetermine the outcome of the analysis." He cites the HBFS as a "perfect example" of this relationship between the structure of a study and its results, arguing that

once...the assumptions of the [bomber] study [were stated], one could have concluded in somewhere between 30 seconds and, perhaps if one were very careful and thoughtful, two or three minutes, how this was going to come out, not necessarily having to go through all the computer runs and all the analysis.¹⁹⁶

By defining the baseline scenario as comprising twin MRCs with North Korea and Iraq, in which warning is available, political decisions and military deployments are rapid, overseas bases are adequate, in-theater tactical air power is ample, and the starts of the two wars are weeks apart, the HBFS limits both the military requirement for and the relative war-fighting contribution of a larger fleet of B-2 bombers. What contribution the added B-2s do make is undervalued by shaky measures of effectiveness, restricted trade-offs, and debatable assumptions about the size and allocation of future PGM stocks. The failure to reckon peacetime attrition alone underestimates the required size of the B-2 force by up to 20 aircraft.

Although the HBFS was conducted by the Institute for Defense Analyses, detailed guidance for the study was provided by the Department of Defense. Organizations within DoD supplied scenarios, threat projections, warning times, force arrival information, aircraft apportionment and sortie allocation data,¹⁹⁷ and, as noted earlier, other "planning assumptions that the Department uses to size the Bottom-Up Review forces and that the Department is currently using in defense planning guidance."¹⁹⁸ That the effort flopped as a sound basis for deciding the future bomber force structure can be traced, to a large extent, to the direction set by DoD. From its inception, then, the HBFS has been a precisely guided analytic bomb. With a \$3-million price tag,¹⁹⁹ it also is an expensive bomb. But it might have an additional, and much more important cost if, by eliminating the option of acquiring more B-2s, the United States is left inadequately prepared for future conflicts.

196. Glenn C. Buchan, Remarks at a National Institute for Public Policy congressional seminar on "U.S. Air Power and Future Conflicts: Operational and Analytical Considerations," June 14, 1996.

197. Koleszar, in *SASC FY 96, Pt. 7*, p. 376.

198. Kaminski, in *HAC FY 96, Pt. 4*, p. 339.

199. *Ibid.*, p. 344.

As the foregoing critique shows, different and equally or more plausible assumptions about the nature of future conflicts and U.S. capabilities for fighting those wars produce a greater demand for heavy bombers. Conditions that could increase demand include: 1) new adversaries; 2) unexpected areas of conflict; 3) short- or no-warning attacks against allies; 4) delays in responding to warning; 5) reluctance of decisionmakers to move forces to theaters under the shadow of WMD; 6) lack of fighter escorts for nonstealthy bombers; 7) lengthy overseas buildups of U.S. air, ground, and naval forces; 8) conflicts in regions where bases are lacking and many targets are beyond the range of tactical strike aircraft; 9) bases vulnerable to nuclear, chemical, or biological attack; 10) truly simultaneous regional conflicts; and 11) difficulties in swinging bombers between conflicts. The ways in which combinations of these conditions interact to affect bomber requirements are particularly important to understand.²⁰⁰

In the first decades of the next century, the United States might find itself drawn into a conflict that occurs with minimal warning, in an unforeseen location, far from CONUS, where few U.S. forces are forward deployed, the enemy enjoys a local military advantage, and the movement of expeditionary forces is delayed or impeded. A conflict of this sort actually is considered by the HBFS in an excursion case—"No Strike TACAIR"—separate from the baseline scenario. The case is downplayed, however, in the briefings on the study and is not reflected in the bottom line. Yet its results should be heeded for all the reasons developed in the previous sections of this paper. Those results indicate (albeit in the flawed framework of the study) that *more than 60 additional B-2s are needed to counter aggression in circumstances where tactical strike aircraft are absent.*²⁰¹ (This is consistent with the findings of other studies.)²⁰² In light of the results, "one can conclude," according to Dr. Kaminski, "that additional bombers do provide an important hedge against additional territorial losses should tactical aircraft not be available, for whatever reason, during the early days of a conflict."²⁰³

Though the HBFS treats the "No Strike TACAIR" case as a secondary one, for which a larger bomber force is only an option, it arguably is among the most important for determining bomber force structure, and one for which more bombers may be a necessity, not a choice. In the baseline scenario the bomber contribution is marginal; in the "No Strike TACAIR" case it is material. If, in line with the results of the baseline case, the force of tactical strike aircraft, after forward deployment, is more than enough to wage two MRCs, then it might make sense to reduce the size of the tactical force to pay for more heavy bombers that can be employed in short-warning conflicts. A better balance between bombers and tactical aircraft might be appropriate, especially since

200. According to General Loh, "when you compound the cumulative effect of no warning time, no TACAIR, and swing [problems] which was not shown [in the HBFS], it shows that bombers are more and more important. They are critically important in the first two or three weeks of major regional conflicts." *HAC FY 96, Pt. 4, p. 351.*

201. Kaminski, in *HAC FY 96, Pt. 4*, pp. 340-342.

202. *Ibid.*, p. 342. See also the studies summarized in "Future Bomber Force."

203. *HAC FY 96, Pt. 4, p. 342.*

there are roughly ten times more short-range strike aircraft than bombers,²⁰⁴ and programmed investment in the two types of forces is similarly lopsided.²⁰⁵ Bombers can be used in long-buildup as well as short-warning scenarios, while tactical aircraft cannot be used in situations where in-theater basing is unavailable. The premium for the insurance offered by a larger bomber force would cost a very small percentage of the defense budget. The appropriate balance between tactical aircraft and heavy bombers, given the likelihood of conflicts like the "No Strike TACAIR" case, is one of the trade-offs the HBFS should have examined.

Finally, what lessons for the Deep Attack/Weapons Mix Study can be drawn from the mistakes of the HBFS? It was, after all, in part because of dissatisfaction with the HBFS that the DAWMS was expanded to include force-structure trade-offs that might involve, among other things, more B-2s.²⁰⁶ Listed below are a half dozen steps DAWMS analysts should take to avoid the missteps of the earlier study. They are both suggestions for "defining the bounds of the problem" and criteria for assessing the "outcome of the analysis."

1) *Examine conflicts other than wars with North Korea and Iraq:* Changes in the world and changes in Pentagon planning soon may cause the two-MRC scenario to disappear. A range of scenarios should be treated in the DAWMS. The study team should take the advice of *Project 2015* and in at least one case evaluate the performance of U.S. strike systems, including bombers, in a hypothetical war with a great power (perhaps China) equipped with advanced weapons and command, control, communications, and intelligence capabilities. Assertions by DoD officials to the contrary,²⁰⁷ it is not obvious that forces prepared to fight two regional powers necessarily are ready to take on a single great power.

2) *Assess bombers in their full range of missions:* Heavy bombers inherently are multimission delivery vehicles. Cost-effectiveness analysis that neglects this fact is incomplete. The strategic attack mission in particular should not be ignored. If history is any guide, bombers someday once again may be used to conduct a strategic air campaign, possibly independent of other forces. Strikes against vital targets well inside an enemy's homeland are truly "deep attack" operations, as opposed to attacks on targets just tens of kilometers beyond the front line. Use of a range of scenarios is a good way to produce mission variety.

3) *Consider surprise attack the norm:* Fourteen days of warning cannot be assumed. Aggressors have strong incentives to seek surprise, and the record shows they usually succeed. Leaders of states subject to surprise have reasons

204. DoD Report for 1996, pp. 166, 172, 174.

205. Welch, in SASC FY 96, Pt. 7, p. 421.

206. John F. Harris and Bradley Graham, "President Decides Against Adding More B-2 Money," *Washington Post*, February 9, 1996, p. A17; "House Directs Independent Oversight for Deep-Strike Trade Study."

207. Organization of the Joint Chiefs of Staff, *National Military Strategy of the United States: A Strategy of Flexible and Selective Engagement* (Washington, DC: GPO, 1995), p. 5; Edward L. Warner III, in "The Coming Defense Train Wreck...And What to Do About It," *Washington Quarterly*, Vol. 19, No. 1 (Winter 1996), p. 121.

to hesitate in responding to warning, and they often do. Any future mix of weapons and strike systems must offer adequate insurance against surprise.

4) *Give greater weight to constraints on U.S. force deployments:* The United States continues to pull back from the forward deployments of the Cold War. In various conflicts other than MRC-West and MRC-East, basing facilities comparable to those in South Korea and Saudi Arabia are unlikely to be available. What bases there are may be politically denied, militarily vulnerable, or geographically remote. Because the "friction" of war affects not only battle plans but deployment schedules, short-range aviation, naval ships, and ground forces may not reach the theater in a timely manner. The DAWMS should take into account conflicts in which long-range bombers represent the bulk of U.S. combat power and retain that distinction for more than the first two weeks of a war.

5) *Select better measures of effectiveness:* These measures should be carefully chosen with reference to the nature of the conflict simulated and U.S. political-military objectives in that war. They should illuminate rather than obscure differences in the effectiveness of various mixes of weapons and strike systems. And their limitations should be made clear when the results of the DAWMS are presented.

6) *Use an adequate inventory of weapons:* The great value of a larger inventory of advanced accurate weapons is one of the principal findings of the HBFS. Analysis in the DAWMS, then, should be based on sufficient weapon stocks. The allocation of munitions among different strike systems (between B-2s and other aircraft, for example) should not be a case of robbing Peter to pay Paul.

By examining trade-offs between the B-2 and other strike systems, the DAWMS will improve on the HBFS. There are, however, grounds for pessimism. Defense officials already have reported to Congress that "[t]he study is evaluating aggregate requirements for deep strike weapons and their delivery systems for two nearly simultaneous major regional conflicts (MRCs), plus possible demands from lesser contingencies."²⁰⁸ Computer simulations for the DAWMS reportedly model the effects of a diverse inventory of advanced munitions on the outcomes of a war on the Korean peninsula and a subsequent conflict with Iraq.²⁰⁹ Under Secretary Kaminski may be right when he says that the DAWMS is "just like the bomber study. You learn from these things incrementally."²¹⁰

208. Kaminski and Ralston, "The DoD Tactical Aviation Modernization Program," p. 34 (emphasis added).

209. "U.S. War Games Put PGMs to the Test."

210. Quoted in "USAF Officials Decry Mission Loss in Pentagon Study."

Mr. PAYNE. Thank you, Mr. Chairman. The first study, "Deterrence in the Second Nuclear Age," is my own analysis of U.S. deterrence requirements for the post-cold-war-period. It reflects the findings of a 20-year study of deterrence theory and practice that I've been engaged in, and I'd like to summarize several of its main conclusions pertinent to consideration of the B-2.

First, and perhaps most importantly, no decision concerning the B-2 force should be made concerning its numbers without taking into full account what I believe is the single most important question about the B-2's future value, and that is how will it contribute to our capability to deter future regional opponents.

Based on all of the unclassified accounts I have seen, the influential Government studies intended to inform decisions about the B-2, including the heavy bomber force study, and the deep attack weapons mix study, do not even take this question into account.

They focus, instead, exclusively on war scenarios and operational questions. This is a tremendous mistake.

For over 2,500 years good strategists have known that preventing wars through deterrence is far superior than fighting wars, and that the first job of your military force is to provide the political leadership with tools for deterrence and coercion, so you don't have to fight wars.

Secretary of Defense Perry understood this point when following the war with Iraq he said, and I quote, clearly the United States does not want to spend the rest of the decade fighting regional conflicts. The key to avoiding such entanglements is to use its new strength to deter these conflicts rather than fight them. And that's right.

Yet consideration of how the B-2 may contribute to regional deterrence appears not to have been a factor in the various models and quantitative analyses used in the government's heavy bomber force study.

To put it simply, if the models and analyses do not take into consideration this single most important question concerning the potential value of the B-2, that is, its contribution to deterrence, it really doesn't matter how much you refine the models.

Mr. HUNTER. Well, just reflecting on that, if you use that analysis, that there's no value in the deterrence, then all of the strategic systems, including the bomber leg, have been worthless investments since 1944. Please proceed.

Mr. PAYNE. Based on my study of deterrence in the post-cold-war period, the B-2 is going to be uniquely suited to meet U.S. requirements.

Let me summarize the military capabilities that I think are likely to be critical for future regional deterrence duties. Because of the great diversity of regional challengers we are likely to confront in the future, U.S. deterrence capabilities need to be extremely flexible in threat and operation. In some cases, conventional threats may suffice for deterrence. In other cases, nuclear threats may be necessary, as appears to have been the case in the gulf war, by the way.

We need to be capable of bringing an awesome level of firepower to the foreign theater within hours of hostilities, and to do so with-

out reliance on forward based forces or allied cooperation, neither of which may be available.

Don't be surprised by my use of the unscientific term such as the need for an awesome level of firepower. Remember, deterrence is a psychological process, and it's a psychological goal. This isn't rocket science.

We want to be able to shape the perceptions and decisionmaking of the opponent, and the opponent's perception of U.S. forces as awesome can easily be the key to deterrence working or not working.

In addition, the capability for an immediate and powerful military response that puts a minimal number of Americans at risk is particularly important for the United States, in some ways uniquely.

Why is that? Past challengers have thought that we could be cowed into accommodation by being confronted with a military fair accompli, that we would not have the political will to respond following initial military losses.

That perception has led challengers to aggression against us. Proper or not, that is a perception of the United States that has been shared by past challengers, from Japan in 1941 to Saddam Hussein 50 years later.

The capability for very rapid and very powerful U.S. action should help us put an end to that dangerous perception.

Finally, we need the capability to demonstrate our military commitment to regional allies on a day in and day out basis, to prevent regional opponents from doubting the credibility of our commitments.

The credibility of a deterrent threat on behalf of an ally cannot be established overnight. It requires a history of demonstrated will and demonstrated solidarity with that ally. This is what Saddam Hussein had not seen when he chose to ignore our warnings and invaded Kuwait.

My findings concerning deterrence lead me to conclude that the B-2 is very likely to provide a unique contribution to meeting our deterrence requirements in what I'm calling the second nuclear age, the post-cold-war period.

The attributes of the B-2 pertinent in this regard are, specifically, one, its potential to bring blocking firepower to a front very rapidly, without reliance on forward basing, and while minimizing the number of Americans at risk; two, its appearance in a challenger's likely perception as the most advanced military technology possible, that is, it's awesome; three, its potential through foreign visits to demonstrate in peacetime our military prowess and commitments on a global basis; and, four, its potential to threaten a wide variety of targets with a wide variety of weapons.

That adds up to a weapons system that will, in my opinion, be of potentially decisive value for regional deterrence in the post-cold war period. And that literally follows a two decade study of deterrence that I've been involved in.

As Secretary of Defense Perry has suggested, because we do not want to fight a series of regional wars in the future, deterrence is going to be the name of the game. Yet, the Government B-2 stud-

ies appear not even to raise the question of deterrence in their assessments of its potential value.

Studies that do not take this into consideration into explicit account and focus instead on narrow operational questions will undervalue its role, and will fail to provide a useful answer.

The second study I'd like to summarize today is entitled, "A Precisely Guided Analytic Bomb: The Defense Department's Heavy Bomber Force Study."

This is not my own work, but that of Kurt Guthie, a former staff member of the gulf war air power survey. And this analysis, as the title suggests, is a critique of the heavy bomber force study, the study frequently cited by Defense officials as justification for the decision to cap the B-2 force.

I cannot do justice to Mr. Guthie's analysis today in a short period of time, but I can provide you with a synopsis of some selected points, and make a copy available to all the members who might want one.

I should note that the report draws solely on unclassified briefings of the bomber study and other open sources.

A little background on the heavy bomber force study itself. In the fall of 1994, Congress directed the Secretary of Defense to carry out a future oriented study of bomber force requirements, and the cost effectiveness of alternative bomber mixes.

In response to this direction, the Defense Department produced the heavy bomber force study and briefed the results to Congress in May 1995. The study concluded that the planned force of 66 B-52H's, 95 B-1B's, and 20 B-2 bombers would be adequate.

Now, the basic conclusion of the Guthie study is that even beyond the considerations of deterrence, which I mentioned earlier, the heavier bomber study regrettably is faulty in its approach, assumptions, and assessment.

The study concentrates on just two adversaries, North Korea and Iraq, and one type of war. The war envisaged in both cases is a cross-border invasion of allied territory by an army of thousands of tanks and armored fighting vehicles.

The heavy bomber study simply excludes other potential enemies and conflicts that are at least as probable, and perhaps more so. It discounts surprise attack, which is a standard gambit of modern aggressors, and typically works.

It predicts that the United States can readily and with impunity amass huge expeditionary forces near the borders of enemies possess weapons of mass destruction; it expects one-half to two-thirds of deployed bombers in a feat never tried in war time, to break off from grueling combat in one major regional conflict and rapidly re-deployed to another theater, and conduct sustained operations to blunt a second armored invasion; and it neglects to account for nontrivial peacetime attrition in the planned bomber force.

Mr. HUNTER. You're talking about the celebrated swing strategy?

Mr. PAYNE. Yes, sir; in all, the Guthie analysis concludes that these faults make the bomber study a poor basis for deciding the size of the B-2 force. The deficiencies of the study, in combination, yield an underestimate of the number of B-2's likely to be necessary for future plausible conflicts.

And ending B-2 production at 21 aircraft on the basis of the study would leave the United States with a small and aging bomber force during an era in which the value of long-range airpower certainly will grow.

Let me summarize in just a few sentences the prominent flaws in the heavy bomber study identified in the Guthie analysis. First, its failure to look at a wide range of future contingencies in which heavy bombers might be tested; second, its underestimation of the likelihood of surprise; third, its overestimation of the availability, adequacy and safety of overseas bases; fourth, its questionable deployments of combat aircraft; and, fifth, its neglect of peace time bomber attrition.

In summary, in the first decades of the next century, the United States may find itself drawn into a very different kind of conflict than those used in this study. It may be a conflict in which there's minimal warning time; it may be an unforeseen location; it may be far from this country where few U.S. forces are forward deployed, where the enemy enjoys a local military advantage, and where the movement of U.S. expeditionary forces is delayed or impeded for political or military reasons.

A conflict of this sort is considered by the bomber study what it calls a secondary and, quote, very extreme case, and separate from the main analysis.

This case is down played in the unclassified briefings of the study, and is not reflected in the bottom line recommendations of the B-2. Yet the results of this case should be heeded, for it is at least as likely as the base case scenarios that did drive the study's conclusions, and the results of this case indicate that more than 60 additional B-2's would be needed to counter aggression in circumstances where tactical strike aircraft are absent.

Though the study treats this case as a secondary one, a very extreme one, it is arguably among the most important for determining bomber force structure, and for which bombers may be a necessity and not a choice.

Let me conclude by suggesting what the lessons may be from this analysis, from the Guthie study in particular, for future analyses.

What lessons from the mistakes of the bomber study can be drawn for the deep attack weapons mix study, the ongoing Department of Defense effort to determine the requirements for deep strike weapons and delivery systems.

Well, fundamentally, steps should be taken to avoid the missteps of the earlier study, which are: First, take deterrence requirements into account, because a priority measure of value for the B-2 should be its potential contribution to regional deterrence; second, examine conflict other than wars with North Korea and Iraq. A range of scenarios should be treated in this study. And at least one case should evaluate the performance of U.S. strike systems, including bombers, in a hypothetical war with a great power.

Third, assess bombers in their full range of missions. Heavy bombers inherently are multimission delivery vehicles. Cost effectiveness analysis that neglects this fact is incomplete.

Fourth, consider surprise attack as the norm—14 days of warning, which is an assumption of the heavy bomber force study, can-

not be assumed. Aggressors have strong incentive to seek surprise, and the historical record shows that they usually succeed.

Fifth, give greater weight to constraints on U.S. force deployments. We we continue to pull back from forward deployment in the cold war, and as there are various conflicts where we may not have the political permission to use other bases, giving greater weight to the constraints on U.S. force deployments is going to be important.

Unless these kinds of factors and considerations are taken into account, the deep attack weapons mix study promises to be as inadequate as is the Heavy Bomber Force Study that went before it. Thank you.

[The prepared statement of Mr. Payne follows:]

Assessing B-2 Requirements

Dr. Keith B. Payne

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Adjunct Professor, Georgetown University
National Security Studies Graduate Program

Two recently completed studies are pertinent to the subject of today's hearing, the future of the B-2 bomber force. Each of these studies will be published within a few weeks and available publicly. In this testimony I would like to summarize several of the main findings from these two studies.

The Importance of Deterrence

The first study, entitled, *Deterrence in the Second Nuclear Age*, is my own analysis of U.S. deterrence requirements for the post-Cold War period. It will be available as a paperback book next month, and reflects the findings of my 20-year study of deterrence theory and practice. I would like to summarize several of the main conclusions pertinent to our consideration of the B-2.

First, and perhaps most importantly, no decision concerning the B-2 force should be made without taking into full account what I believe is the single most important question about the B-2's future value, that is, what will be the B-2's contribution to our capability to *deter* future regional opponents?

Based on all the unclassified accounts I have seen, the influential government studies intended to inform decisions about the B-2, including the Heavy Bomber Force Study and the Deep Attack/Weapons Mix Study, do not even take this question into account. They focus instead exclusively on war scenarios and operational questions. This is a tremendous mistake. For over 2500 years good strategists have known that preventing wars through deterrence

is far superior to fighting wars, and that the first job of your military force is to provide the political leadership with the tools for deterrence and coercion so that you do not have to fight wars.

Secretary of Defense Perry understood this point when following the war with Iraq he said, "Clearly, the United States does not want to spend the rest of the decade fighting regional conflicts. The key to avoiding such entanglements is to use its new strength to deter these conflicts rather than fight them."¹

Yet, consideration of how the B-2 may contribute to regional deterrence appears not to have been a factor in the various models and quantitative analyses used in the government studies. To put it simply, if the models and analyses do not take into consideration the single most important question concerning the potential value of the B-2, i.e., its contribution to deterrence, it really does not matter how much you refine the models, you will not get a useful answer.

Second, based on my study of deterrence in the post-Cold War period, the B-2 will be uniquely suited to meet U.S. requirements. I can summarize the military capabilities that are likely to be critical for future regional deterrence duties. Because of the great diversity of regional challengers we may confront in the future, U.S. deterrence capabilities will need to be extremely flexible in threat and operation. In some cases conventional threats may suffice for deterrence. In other cases nuclear threats may be necessary, as appears to have been the case in the Gulf War.

We will need to be capable of bringing an awesome level of firepower to a foreign theater within hours of hostilities, and to do so without reliance on forward-based forces or allied cooperation, neither of which may be available. Do not be surprised by my use of an unscientific term such as the need for an

¹William J. Perry, "Desert Storm and Deterrence," *Foreign Affairs* Vol. 70, No. 4 (Fall 1991), p. 82.

"awesome" level of firepower. Remember that deterrence is a psychological process not rocket science—we want to shape the perceptions and decisionmaking of the opponent. The opponent's perception of U.S. forces as "awesome" may easily be a key to successful deterrence.

In addition, the capability for an immediate and powerful military response that puts a minimal number of Americans at risk is particularly important for the United States. Past challengers have thought that we could be cowed into accommodation by being confronted with a military *fait accompli*—that we would not have the political will to respond following a *fait accompli*. That perception has led challengers to aggression against us. Proper or not, that is a perception of the United States that has been shared by past challengers, from Japan in 1941 to Saddam Hussein fifty years later. The capability for very rapid and very powerful U.S. action should help put an end to this dangerous perception.

Finally, we will need the capability to demonstrate our military commitment to regional allies on a day-in- and day-out-basis to prevent regional opponents from doubting the credibility of our commitments. The credibility of a deterrence threat on behalf of an ally typically cannot be established overnight; it requires a history of demonstrated will and solidarity. This is what Saddam Hussein had not seen when he choose to ignore our warnings and invaded Kuwait.

My findings concerning deterrence lead me to conclude that the B-2 is very likely to provide a unique contribution toward meeting our deterrence requirements for the post-Cold War period. The attributes of the B-2 pertinent in this regard are: its potential to bring blocking firepower to a front very rapidly, without reliance on forward basing and while minimizing the number of Americans at risk; its appearance in a challenger's likely perception as the most

advanced military technology possible, that is, "awesome"; its potential to demonstrate in peacetime our military prowess and commitments on a global basis; and its potential to threaten a wide variety of targets with conventional and nuclear weapons. This adds up to a weapon system that will, in my opinion, be of potentially decisive value for regional deterrence in the post-Cold War period.

As Secretary of Perry has suggested, because we do not want to fight a series of regional wars in the future, deterrence will be the name of the game. Yet, the government B-2 studies appear not even to raise the question of deterrence in their assessments of the potential value of the B-2. Studies that do not take this consideration into explicit account, and focus instead only on narrow operational questions, are likely to undervalue its role and fail to provide a useful answer.

Critique of the Heavy Bomber Force Study

The second study pertinent to today's hearing is entitled, *A Precisely Guided Analytic Bomb: The Defense Department's Heavy Bomber Force Study*. This is not my own work, but that of Kurt Guthe, a senior analyst at the National Institute for Public Policy and a former staff member of the Gulf War Air Power Survey. This analysis is a critique of the Heavy Force Bomber Study, a study frequently cited by defense officials as justification for the decision to cap the B-2 force at its current level. I cannot do justice to the detail in this analysis, but I can provide a synopsis of some selected points, and make an advance copy of the full report available to the committee. I should note that the report draws solely on unclassified briefings on the bomber study and other open sources. The Heavy Bomber Force Study itself is classified.

As you know, in the fall of 1994 Congress directed the Secretary of Defense to carry out a future-oriented study of bomber force requirements and the cost-effectiveness of alternative bomber mixes (including bomber upgrades and munitions). In response to this direction, the Defense Department produced the Heavy Bomber Force Study and briefed the results to Congress in May 1995. The study concluded that the planned force of 66 B-52H, 95 B-1B and 20 B-2 bombers would be adequate for the hypothetical conventional conflicts current national strategy has been devised to win. (Since the study was completed, one B-2 and five B-52Hs have been added to the planned force.) Improved electronic countermeasures and better conventional weapons for the B-1B, along with larger numbers of accurate guided munitions for bombers and tactical strike aircraft were judged more cost-effective than a larger force of B-2s.

Even beyond considerations of deterrence, the bomber study regrettably is faulty in its approach, assumptions, and assessment. Despite the significant uncertainties that attend the emerging post-Cold War security environment, the study concentrates on just two adversaries—North Korea and Iraq—and one type of war. The war envisaged in both cases is a cross-border invasion of allied territory by an army with thousands of tanks and armored fighting vehicles. The study simply excludes other potential enemies and conflicts that are at least as probable, perhaps more so. It discounts surprise attack, a standard gambit of modern aggressors. It predicts the United States readily and with impunity can amass huge expeditionary forces near the borders of enemies possessing weapons of mass destruction and missiles. It expects one-half to two-thirds of deployed bombers, in a feat untried in wartime, to break off from grueling combat in one major regional conflict, rapidly redeploy to another theater, and conduct sustained operations to blunt an armored invasion. And it neglects to account for nontrivial peacetime attrition in the planned bomber force.

In all, these faults make the bomber study a poor basis for deciding the size of the B-2 force. The deficiencies of the study, in combination, yield an underestimate of the number of B-2s likely to be necessary for future conflicts. Ending B-2 production at 21 aircraft on the basis of the study would leave the United States with a small and aging bomber force during an era in which the value of long-range air power almost certainly will grow.

Although there are many flaws in the bomber study, I will focus on five:

1) failure to look at a wide range of future contingencies in which heavy bombers might be tested; 2) underestimation of the likelihood of surprise; 3) overestimation of the availability, adequacy and safety of overseas bases; 4) questionable deployments of combat aircraft; and 5) neglect of peacetime bomber attrition.

Future Contingencies

In line with the Bottom-Up Review and other defense planning guidance, the study posits two "nearly simultaneous" major regional conflicts: a North Korean invasion of South Korea, followed by an Iraqi invasion of Kuwait and Saudi Arabia. The study projects how bomber and other forces might perform in these conflicts in the year 2014. Given that heavy bombers have service lives measured in decades, the study is correct in trying to weigh their war-fighting worth in 2014. But it errs in extrapolating the North Korea-Iraq scenario out to that same date and using it as the strategic context in which alternative bomber mixes are evaluated.

As events of the recent past show, political-military developments are impossible to forecast with any certainty, especially over a 20-year time frame. Yet while predictions about the future security environment are limited by inescapable uncertainties, it seems a safe bet that the dangers of 2014 will be

much different from those of the present. The next military opponent of the United States cannot be known with any certainty and could be any of several currently or potentially hostile powers. "Country X" might not be a mid-size adversary like Iraq or North Korea, but a hostile great power. That great power might be a rising China, with the saber rattling before this year's Taiwanese presidential election presaging more dangerous aggression by Beijing. For an East Asian conflict other than a second Korean war, the lack of basing and the expanse of the theater would limit the effectiveness of shorter-range tactical strike aircraft. Heavy bombers, with their intercontinental range, would be much less constrained. In general, the "Country X" conflicts absent from the bomber study may involve the need to project power far inland, away from waters plied by aircraft carriers and air bases situated in allied countries, even if the immediate scene of conflict is along a continental periphery.

To take into account conflicts other than those against North Korea and Iraq would alter both the number and kinds of bomber sorties required (more strategic attack and fewer air interdiction sorties, for example), and also would change bomber force requirements. Bombers inherently can be employed in various kinds of wars, campaigns, and operations, and any analysis of their value should reflect that fact. The analytic approach of the bomber study is akin to judging an athlete's potential for the decathlon solely on the basis of his time in the 400-meter run.

Surprise Attack

The main case analyzed in the study assumes that the United States has 14 days of strategic warning. Warning is essential for the prewar, in-theater buildup of U.S. forces. In actuality, such warning may not be available. According to the Director of Central Intelligence, the North Korean army "is

positioned and equipped to launch an aggressive attack southward with little or no warning."² Iraq likewise can move quickly against its southern neighbors. Moreover, warning problems are not confined to the specific contingencies analyzed in the bomber study. In general, the historical record of the last 50 years shows that an aggressor intent on achieving surprise almost certainly will succeed. Surprise results from irreducible ambiguities in intelligence information, bureaucratic pathologies in intelligence organizations, and other problems for which there are no easy remedies, including misperceptions and hesitations by national leaders on the receiving end of sudden attacks.

With little or no warning, the U.S. buildup before a major regional conflict would be absent or attenuated, and greater reliance would need to be placed on forces that could reach the theater rapidly and arrest the enemy attack on arrival. From the United States, heavy bombers can fly to any location within 24 hours and deliver large bomb loads without first landing at overseas bases. Short-warning conflicts are likely to require more bombers than contingencies for which there is time to move Desert Storm-sized expeditionary forces to the theater before the start of hostilities.

Overseas Basing Availability

For the Korean and Persian Gulf conflicts considered in the bomber study, substantial basing infrastructure is available and sizable forward-deployed forces are present. Given limitations on the basing available in much of the world, it is imprudent to assume these conditions will be the norm. For alternative future contingencies, there may be a lack of in-theater bases (for possible conflicts in, say, Southeast Asia or Central Eurasia). Foreign bases that are available may lack

²John Deutch, in Senate Select Committee on Intelligence, *Hearings, Current and Projected National Security Threats to the United States and Its Interests Abroad*, 104th Cong., 2d sess. (Washington, DC: GPO, 1996), p. 6.

the capacity to accommodate a large-scale U.S. buildup. If adequate bases are located within the theater, the United States nonetheless may be denied access for political reasons. Countries also may deny base access for fear of becoming targets of missile strikes.

Where bases for combat aircraft and other forces are available and accessible, the facilities themselves may be vulnerable to missile or air strikes, acts of sabotage, or ground assaults. Likewise, threats from enemy mines, antiship missiles, and strike aircraft could keep "floating air bases" (aircraft carriers) at risk and at a distance from unfriendly coastlines, at least initially, decreasing their effective operating ranges and sortie rates of their aircraft. U.S. decisionmakers, like foreign leaders, may be reluctant to authorize deployment of forces to bases that are under the shadow of weapons of mass destruction. Deterrence and active defense may be inadequate to protect forward-deployed forces and allied populations from missile attacks or to reassure decisionmakers concerned about their safety.

The campaigns planned for the two major regional conflicts of the bomber study could not be waged without in-theater bases. Tactical strike aircraft, which represent the bulk of the air power used in the campaigns would be unavailable. With their intercontinental range, bombers could operate from bases outside the reach of enemy missiles, including, if necessary, home bases in the United States.

Combat Aircraft Deployments

The bomber study makes debatable assumptions about the wartime deployments of U.S. aircraft. For example, it assumes that fighters will be present to protect nonstealthy bombers, even in conflicts where warning time is short, air bases are denied, and aircraft carriers are out of position. Fighter protection for the B-52H and B-1B bombers has the effect of obscuring the edge

the B-2 enjoys over these aircraft by virtue of its stealth characteristics. Dependence on escorts would limit the older bombers to targets within the shorter combat radii of the fighters, thereby depreciating one of the distinguishing operational advantages of long-range aircraft. The considerable cost of fighter cover was not included in the bomber study calculation by which B-1B upgrades were judged more cost-effective than procurement of additional B-2s. If vulnerable without fighter support, nonstealthy bombers might be restricted to launching limited numbers of stand-off weapons, which are many times the cost of direct-attack munitions, and less effective in delivering antiarmor submunitions. Or they simply might be incapable of conducting missions in the initial stages of the conflict. The number of B-2s required would be substantially greater if protection for older bombers were unavailable.

The study also is based on unrealistic deployment schedules for tactical aircraft. In the simulated Persian Gulf conflict, more tactical aircraft arrive in the theater more quickly than was true in either Desert Shield or Operation Vigilant Warrior (the October 1994 deployment of U.S. forces to Southwest Asia when another Iraqi invasion of Kuwait appeared imminent). In addition, various factors raise doubts about the timely deployment of tactical aircraft and other forces to overseas theaters. Attacks involving weapons of mass destruction could close in-theater air bases designated to receive U.S. aircraft. The bomber study does not consider nuclear or biological attacks on air bases. Nor does it explicitly model missile strikes on these facilities. If deployments are not postponed or precluded by attacks on bases, the units that arrive still may be ill-prepared for sustained combat because of inadequacies in logistics support for rapidly deployed expeditionary forces. Lengthy deployment times would reduce the ability of tactical strike aircraft to counter an invasion promptly. In contrast, heavy bombers operating from the United States, or from bases between the

United States and the theater, could strike powerful blows against an enemy from the outset of the conflict.

Peacetime Bomber Attrition

Aging and peacetime attrition of the bomber force are not taken into account in the study. By 2014, the heavy bomber fleet will be older than any other major force element. The study assumes B-52Hs will have a service life of unexampled length, remaining in the inventory through 2030, almost 70 years after the last Stratofortress rolled off the assembly line. Air operations in peacetime entail the loss of some aircraft as a result of mechanical failure, human error, or natural events. While the study disregards attrition, Air Force planning factors suggest that 15 to 20 bombers will be lost to peacetime attrition between now and 2014. When attrition is considered, the number of bombers required increases. Without a warm production line, bombers lost to peacetime attrition, or in combat, could not be replaced for future contingencies, conventional or nuclear.

In the first decades of the next century, the United States might find itself drawn into a conflict that occurs with minimal warning, in an unforeseen location, far from this country, where few U.S. forces are forward deployed, the enemy enjoys a local military advantage, and the movement of expeditionary forces is delayed or impeded. A conflict of this sort actually is considered by the bomber study, though as a secondary case called "No Strike TACAIR," separate from the main analysis. The case is downplayed in the unclassified briefings on the study and is not reflected in the bottom line. Yet the results should be heeded for all the reasons outlined above. Those results indicate (albeit in the flawed framework of the study) that more than 60 additional B-2s are needed to counter aggression in circumstances where tactical strike aircraft are absent.

(This is consistent with the findings of other studies.) Though the study treats the "No Strike TACAIR" case as a secondary one, for which a larger bomber force is only an option, it arguably is among the most important for determining bomber force structure, and for which bombers may be a necessity and not a choice.

Lessons for Future Analyses

What lessons from the mistakes of the bomber study can be drawn for the Deep Attack/Weapons Mix Study, the ongoing Defense Department effort to determine the requirements for deep-strike weapons and delivery systems (including heavy bombers and their weapons)? Steps that should be taken to avoid the missteps of the earlier study include:

- 1) *Take deterrence requirements into account:* A priority measure of value for the B-2 should be its potential contribution to regional deterrence. The attributes of the B-2 appear to make it uniquely suited for deterrence purposes.
- 2) *Examine conflicts other than wars with North Korea and Iraq:* Changes in the world—and changes in Pentagon planning—soon may cause the North Korea-Iraq scenario to disappear. A range of scenarios should be treated in the Deep Attack/Weapons Mix Study. At least one case should evaluate the performance of U.S. strike systems, including bombers, in a hypothetical war with a great power (perhaps China) equipped with advanced weapons and command, control, communications, and intelligence capabilities. Assertions by Defense Department officials to the contrary, it is not obvious that forces prepared to fight two regional powers necessarily are ready to take on a single great power.
- 3) *Assess bombers in their full range of missions:* Heavy bombers inherently are multimission delivery vehicles. Cost-effectiveness analysis that neglects this fact is incomplete. The strategic attack mission in particular should not be ignored. If history is any guide, bombers someday once again may be used to conduct a strategic air campaign, possibly independent of other forces. Strikes against vital targets well in the interior of an enemy's homeland are truly "deep attack" operations, as

opposed to attacks on targets just tens of kilometers beyond the front line. Use of a range of scenarios is a good way to produce mission variety.

4) *Consider surprise attack the norm:* Fourteen days of warning cannot be assumed. Aggressors have strong incentives to seek surprise, and the record shows they usually succeed. Leaders of states subject to surprise have reasons to hesitate in responding to warning, and they often do. The future mix of weapons and strike systems should offer adequate insurance against surprise.

5) *Give greater weight to constraints on U.S. force deployments:* The United States continues to pull back from the forward deployments of the Cold War. In various conflicts other than those against North Korea and Iraq, basing facilities comparable to those in South Korea and Saudi Arabia are unlikely to be available. What bases there are may be politically denied, militarily vulnerable, or geographically remote. Because the "friction" of war affects not only battle plans but deployment schedules, short-range aviation, naval ships, and ground forces may not reach the theater in a timely manner. The Deep Attack/Weapons Mix Study should take into account conflicts in which long-range bombers represent the bulk of U.S. combat power and retain this distinction for much of the war.

Mr. HUNTER. Thank you, Dr. Payne. Yes, Norm.

Mr. DICKS. Mr. Chairman, just let me make one comment. One of the things I forgot to say, that was in my prepared statement, was the cost of the gulf war was \$70 billion—\$10 billion to move our forces out there, and \$60 billion to prosecute the war on behalf of the United States and our allies.

So when Dr. Payne talks about deterrence, deterrence has some value. And, number two, when you think about what Kissinger said about nuclear weapons, that nuclear weapons basically can't be used, they're there for deterrence alone, we're not going to probably use our Trident submarines, but we hope they will deter nuclear war.

In this case we have a conventional weapon that is a deterrence, but also, if deterrence fails, can be used with this variety of conventional weapons. So in my mind, it's even a more revolutionary and more important deterrence than nuclear weapons. Thank you.

Mr. HUNTER. Thank you. Dr. Payne, thank you for a very concise statement.

Dr. Buchan.

STATEMENT OF GLENN C. BUCHAN, Ph.D, ASSOCIATE PROGRAM DIRECTOR FOR FORCE MODERNIZATION AND EMPLOYMENT, THE RAND CORP.

Mr. BUCHAN. Thank you, Mr. Chairman.

Since I've been preceded by such articulate spokesmen, I think I can save the committee's time by trying to be even briefer than I was planning to be.

I've submitted a copy of a statement for the record—

Mr. HUNTER. Without objection, your statement and all statements submitted for the record by the panel will be included in the record.

Mr. BUCHAN. Thank you, Mr. Chairman.

Now, I'll try to quickly go through and make some selected summary points, and then I'll be happy to answer your questions.

First, I want to just say this work which Congressman Dicks can now articulate probably even better than I can, since he's heard it is much, is a result of a series of RAND studies over several years aimed at addressing the national question of how to structure the bomber force, given all the problems that you know about.

We reported this work to a number of congressional committees in recent years, and we're pleased to have the opportunity to appear before this committee and to discuss these issues as well.

Briefly I want to talk about why we care about bombers in the first place, and I'll try to be brief here since I think my colleagues have covered that pretty thoroughly, then say some things about the unique contributions of the B-2, and make some comments about what we need to do to make the overall bomber force effective, and say something about force level requirements.

First, you've heard the basic arguments about why we care about long-range bombers, and they're particularly appropos to the post-cold-war world where forces are shrinking, defense budgets are shrinking, and we're withdrawing more toward the United States.

What long-range bombers provide is a means of providing massive fire power virtually anywhere in the world in a matter of

hours. So to the degree that U.S. planners care about that sort of capability, they ought to be interested in long-range bombers.

Now, I'm going to argue, as Dr. Payne has, for example, that there ought to be the particular focus of much of our effort in the post-cold-war world, because it reflects the realities of both our own internal budget situation, overseas basing option, notions of allies and so on.

In point of fact, heavy bombers could be the only practical option in some cases that matter, which means they could feel a unique niche in U.S. military capability. That's particularly true in regions where there's little or no naval presence at the critical moment when the campaign begins, or situations where either massive or sustained fire power is needed.

For example, to allude again to the gulf war, even with two aircraft carriers already on the scene, it would have required nearly 3 weeks during Operation Desert Shield to move enough tactical aircraft into the theater to stop the kind of armored invasion the Iraqis could have mounted against Saudi Arabia in the early days of the war, had they chosen to do so.

A long-range bomber force offers a potential counter of future contingencies of that sort if the bombers can survive enemy air defenses with little or no external assistance, locate, identify and destroy enough critical targets to have a decisive impact during the early phases of the campaign.

Now, that takes some doing. And in trying to understand that sort of force, we first examined a range of scenarios. Our preference has been to try to identify and emphasize cases where bombers can have a real impact, and conditions that stress the bomber force and provide a basis for structuring it.

That leaves other scenarios to be lesser included cases for evaluating the bomber force at least, and policy makers can then decide how much weight to attach to the stressing cases. Value judgments about what military situations the United States needs to be able to deal with and can afford to prepare for are really the decisive factors in determining what sort of bomber force the United States ought to have.

I should also note that designing a bomber force in this fashion has important implications for structuring the rest of U.S. military forces—at least to direct trades among bombers, shorter range aircraft, naval forces and ground forces, it would miss entirely in an analysis focused only on one type of force, such as long-range bombers, or on one class of mission, such as, so-called deep attack.

Making these sort of cross-force and cross-service trades is the key to buying the most effective military capabilities for the United States in a time of fiscal austerity.

Now, I want to talk about what makes B-2's special, most of which you've already heard, but let me take a chance and reiterate it some of it again. B-2 stealthiness offers particular advantages when operating relatively autonomously in a hostile environment.

First, there's no payload penalty for standoff weapons, since the bomber can move very close to its targets. That reduces the bomber force requirements by a factor of about three. An ability to find movable targets within limited areas using its own stealthy sen-

sors, which allows it to do things that no other platforms can currently do now.

And, finally, the ability to use simpler and cheaper weapons than aircraft that have to stand off farther from their targets by taking maximum advantage of the onboard sensors and crew. Congressman Dicks gave you an example. This can save as much as two orders of magnitude of cost of weapons.

So, the B-2 is potentially a very interesting sort of platform. In particular, if one values the idea of having a bomber force that can react autonomously and almost immediately to a distant theater with very little support, on virtually no warning, then B-2's are quite interesting.

Now, while no one can say with certainty how likely such a short warning scenario will be in the future, it's reasonable to assume that others learned lessons from the gulf war as well. And one of those lessons certainly is that allowing the U.S. military the time to move its forces into an area, prepare fully, and then initiate a war on its own terms can be suicidal.

Now, Congressman Dicks already gave one of my favorite examples of what three B-2's can do, in effect halting an armored invasion in its tracks, an Iraqi scenario. Now, that's the good news.

But let me tell you a little about the force level implications to suggest to you why a rather large number of B-2's might be necessary to maintain this capability. And I illustrated it in one of the futures of my paper. If you have it, it's figure 3.

If you began with three suitably equipped and armed B-2's over an armored column, that might be adequate to stop it as long as the enemy cooperates, by which I mean they cluster their tanks together, they don't take even the simplest sort of operational countermeasures, like interspersing trucks and tanks, and, as Bill Cosby likes they say, they move in straight lines and obey all the rules.

If they take the simplest kind of countermeasures, the sort of things I've described, that could at least triple the number of bombers that need to be over the target at the same time.

So now you've worked up from a number of three to nine. If you then suggest that the United States should be able to move, to counter a move whenever they do, and that's certainly an essential element of the sort of deterrence that Dr. Payne was talking about. That means tripling the size of the force again to be able to maintain this presence on station.

And if you also say that you'd like to be able to operate, at least in the early phases of a campaign from continental United States [CONUS] bases, which, after all is one of the advantages of long-range bombers, that doubles the force yet again.

If you throw in a factor of 10 to 20 percent for peace time attrition, that three very quickly becomes 60 bombers.

So that's the kind of argument for just one critical class of mission that can quickly drive force levels under what we would consider to be very reasonable conditions to something on the order of 60.

Now, I want to say briefly some things about making the entire bomber force effective. Again, Congressman Dicks explained this

quite articulately, and he's heard me preach about this for several years.

But addressing the B-2 question is only part of the larger problem. Regardless of whether or not the United States chooses to buy additional B-2's, it will have to make changes to whatever bomber force it retains to make that force effective.

Most important, it will have to buy large quantities of better weapons. Second, the bombers themselves, including the B-2, need some modifications, some of which are not in the budget.

Equipping bombers with better weapons is a prerequisite for making whatever bomber force the United States retains effective. This is not a tradeoff. Our analyses have shown for years the relative importance of better weapons for bombers. Without better weapons, any of the bomber forces that the United States is considering will be only of limited value.

Similarly, the bombers themselves require some modifications. And I'll spare you the whole litany, but I want to emphasize the sort of improvements that are necessary to help the bombers carry the largest possible number of weapons that they can, and improve their capability to use information for targeting mission planning and so on as effectively as possible.

Part of a general trend we see for the future is extending the life, increasing the value of aircraft by continuously modifying them. That's particularly important in the information arena where technology is changing so rapidly.

And I've included a figure here that demonstrates that the relative costs of the modifications are quite modest, compared to the overall costs of bombers themselves, and the payoff is quite substantial.

We think that's going to be a relatively stable part of U.S. defense planning from now on, and it's a shift of gears from the way we've done things in the past.

Now, I want to briefly mention, but not dwell on, a general concern we have, and that's the time it's taking to acquire the weapons and modify the bombers. It's simply taking too long even to do relatively simple things. And that's something the United States has got to do better.

At the very least, we now face a situation where until at least the turn of the century the heavy bomber force is going to have modest capability, simply because it doesn't have enough of the right kind of weapons.

Also, ironically, the program as it stands now is most suitable for a large B-2 force, because the planned weapon buys are most appropriate for a force dominated by B-2's, even though the planned B-2 force is very small.

Moreover, using the B-2 force effectively for anything other than strikes against high value targets requires modifications of the bombers that either are not in the current plans, or come along very late in the program. And that's got to change.

Now, let me just comment briefly on force level considerations, beyond what I've already said. We did some analysis that suggested that for a reasonably demanding major regional conflict, that if we had the sort of programmed force that DOD plans now,

it might be adequately effective, but only under extremely favorable conditions.

I'm talking now about a force of 20 B-2's, or 21 B-2's—excuse me. Slightly less than 100 B-1's, and about 60 B-52's. The problem with such a force is that even if it were to work more or less as it is supposed to, there is no reserve force for nuclear use. That would mean at least an additional 40 to 50 B-52's. Very little margin for attrition, no margin for tradeoffs of long-range bombers against other types of forces, no extra fire power to compensate for unexpected situations, such as operational countermeasures, or enemy maneuver forces, which could take up to another 40 or so B-2's, and only a limited capability to support a second major regional conflict. Thus, that force is, at best, very precarious.

Now, let me just conclude with a few observations from all of this. First, if the Nation wants to be able to halt very large scale short warning attacks anywhere in the world, including places where the United States doesn't have forces already in place, then buying more B-2's is an attractive, albeit expensive option. It's not the need is much less compelling.

In any event, the need for more B-2's is governed almost entirely by scenario assumptions. All of the options for using bombers autonomously for halting invading armies are operationally and technically demanding, and involve considerable risk.

Buying large quantities of advanced weapons and modifying the bombers themselves are prerequisites for developing an effective bomber force, whatever its composition. Because of the projected time lags in procuring needed weapons and modifying all three bombers, conventional bomber force will remain relatively ineffective into the next century, no matter how large it is.

Moreover, extending the procurement of additional B-2's over too long a period of time can call into question the long-term viability of the airplane's Stealth technology.

Finally, a key question remains unresolved: the tradeoff between long-range bombers and other forces. It may turn out that retaining a large bomber force, including more B-2's at the expense of other types of forces can prove cost-effective and offer the United States new strategic options more appropriate for the post-cold war world.

The analysis to support or refute that hypothesis has yet to be done.

Thank you, Mr. Chairman. That concludes my remarks.

[The prepared statement of Mr. Buchan follows:]

C O N G R E S S I O N A L T E S T I M O N Y



RAND

*Modernizing The Bomber
Force: More B-2s?*

Glenn C. Buchan

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Modernizing the Bomber Force: More B-2s?

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House of Representatives

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¹ The views and recommendations in this testimony are solely those of the author and do not necessarily represent those of RAND or any of its research sponsors.

Preface

We are here to discuss RAND's assessment of how to provide the United States with an effective bomber force for the future. Of particular current interest is the issue of whether the United States should procure additional B-2 bombers to supplement the 20 that are currently planned. That issue has to be evaluated in the broader context of U.S. national security objectives, military force posture, and the overall bomber force structure. Informing such choices has been the objective of the series of bomber studies that RAND has conducted over the last several years. We have reported this work to a number of Congressional committees in recent years and are pleased to have the opportunity to appear before this committee to discuss these issues.

Issues

Here's what we plan to cover:

- The role of long-range bombers
- The unique contribution of the B-2
 - implications for B-2 force structure
- Making the bomber force effective

Why Bombers?

The fundamental characteristics that distinguish heavy bombers from other weapons are their long range and their substantial payload capability. They can deliver large, diverse payloads virtually anywhere in the world in a matter of hours. That means they have inherent advantages in situations where massive and/or sustained firepower matter, particularly if the attacks need to be made at long range from relatively safe bases or into areas where the U.S. has little or no military presence. Similarly, the ability of long-range bombers to strike from great distances obviates the need to depend on local countries for permission to either use their bases on or overtly their national territory, an advantage demonstrated by the B-52s that struck targets in Iraq last week. To the degree that this kind of capability is important, planners should be interested in heavy bombers.

Although long-range bombers have traditionally played a variety of roles in U.S. military operations, I want to focus on one that is something of a new wrinkle in the evolving post-Cold War world. With U.S. military forces shrinking in size

and generally withdrawing from overseas bases, the United States has limited options available for bringing force to bear in the early hours or days of an emerging conflict in a remote part of the world. Indeed, heavy bombers could be the only practical option in some cases of interest, which means they could fill a unique niche in U.S. military capability. That is particularly true in regions where there is little or no naval presence at the critical moment when the campaign begins or in situations where either massive or sustained firepower is needed. For example, as Figure 1 shows, even with two aircraft carriers already on the scene, it would have required nearly three weeks during Operation Desert Shield to move enough tactical aircraft into the theater to stop the kind of armored invasion that the Iraqis could have mounted against Saudi Arabia in the early days of the Gulf War. A long-range bomber force offers a potential counter to future contingencies of that sort if the bombers can:

- Survive enemy air defenses with little or not external assistance
- Locate, identify, and destroy enough critical targets to have a decisive impact during the early phases of a campaign

Our analysis showed that doing that would require new weapons for the bombers, improvements to the bombers themselves, and new operational concepts for the bombers.

In examining alternatives for structuring the bomber force, we have tried to identify and emphasize cases in which:

- Bombers can have real impact
- Conditions stress the bomber force and provide a basis for structuring it.

Many other scenarios then tend to be “lesser included” cases for evaluating the bomber force and policy makers can then decide how much weight to attach to the stressing cases. *Value judgments about what military situations the U.S. needs to be able to deal with and can afford to prepare for are really the decisive factors in determining what sort of bomber force the U.S. should have.*

I should also note that designing a bomber force in this fashion has important implications for structuring the rest of the U.S. military forces. It leads to direct trades among bombers, shorter range aircraft, naval forces, and ground forces that would be missed entirely in an analysis focused only on one type of force (e.g., long-range bombers) or one class of mission (e.g., so-called “deep attack”). Making these “cross-force” and cross-service trades is the key to buying the most effective military capability for the United States in a time of fiscal austerity.

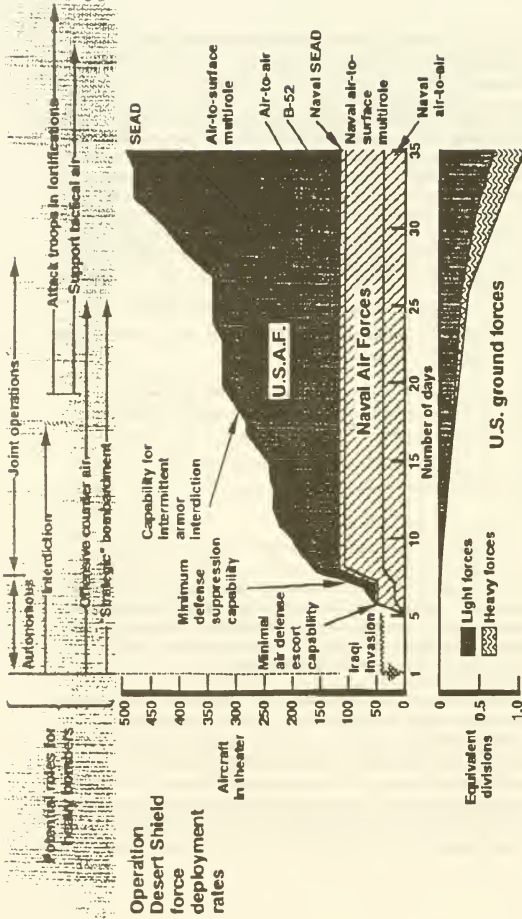


Figure 1—Potential Role of Long-Range Bombers in the Initial Phases of a Major Theater Campaign

In general, we found that long-range bombers make the greatest relative contributions in scenarios in which:

- Massive firepower is needed (for example, to halt an invasion—particularly an armored invasion—of a relatively weak country by a much stronger neighbor).
- There is very limited U.S. or other allied military presence in the area at the outset of the conflict (e.g., few prepositioned forces, little or no advanced warning).
- The theater of conflict is a long distance from the United States or other concentration of “friendly military forces”
- The theater is large enough to provide “battlespace” for the defenders (i.e., to prevent a successful blitzkrieg that could produce an early victory for the attacker before the U.S. could react)

The more of these characteristics a particular scenario includes, the more likely it is that a large, capable bomber force could make a relatively large contribution. That’s why, for example, Southwest Asia is a “bomber theater” (i.e., one where a large, capable U.S. bomber force could have a substantial effect) and Korea is not. It also suggests why assumptions about strategic warning time and the U.S. reaction to warning critically affect choices about the size and character of the bomber force. Adding in capable enemy air defenses stresses the bomber force still more, as does the need to find, identify, and attack difficult targets (e.g., invading maneuver forces) efficiently.

Focusing on the most difficult cases such as short-warning scenarios for evaluating bombers, would, of course, tend to lead to requirements for a larger, more capable (and more expensive) bomber force than would be needed otherwise. However, designing a bomber force to deal with short-warning contingencies might provide enough excess firepower to in less-demanding situations that other types of forces could be reduced to help defray the costs of the more robust bomber force. So far, there has been only a limited attempt in the defense community to address these trades.

Why B-2s?

The B-2’s stealthiness offers particular advantages when operating relatively autonomously in a hostile environment.

- No payload penalty for standoff weapons since it can get very close to its targets

- An ability to find movable targets within limited areas using its own stealthy sensors
- The ability to use simpler, cheaper weapons than aircraft that have to standoff farther from targets by taking maximum advantage of its onboard sensors and human crew.

Thus, the B-2 is potentially well suited to perform demanding tasks such as halting an armored invasion. Indeed, determining the relative importance of being able to halt a large-scale invasion by a modern force in a distant theater where there is little or no U.S. presence and very little strategic warning is the critical value judgment in deciding how many B-2s the U.S. ought to buy. The need for bombers to operate relatively autonomously for a period of time in a hostile environment and the nature of the adversary will critically affect the structure of the rest of the bomber force and its weapons as well. While no one can say with certainty how likely such a "short warning" scenario will be in the future, it is reasonable to assume that others learned lessons from the Gulf War as well, and one of those lessons certainly is that allowing the U.S. military the time to move its forces into an area, prepare fully, and then initiate a war on its own terms can be suicidal!

The B-2, however, is a new aircraft and still needs to demonstrate some of the necessary capabilities for such difficult missions. Moreover, as we will discuss later, the B-2 will require modifications and new weapons to be fully effective.

Figure 2 shows how effective a small number of properly equipped B-2s could be in stopping an armored advance. The left side of the figure shows a "before photo" based on a computer simulation of an Iraqi armored division marching down the road toward Saudi Arabia. The right side of the figure shows an "after photo" following a simulated attack by three B-2s armed with inertially guided tactical munitions dispensers (TMDs) equipped with Skeet submunitions. Note that neither the B-1 nor the B-52 could do this in anything but a totally benign air defense environment. Over half of the combat vehicles in the division were destroyed within seconds, which should not only stop that division, but also, according to standard rules of thumb, damage it so heavily that it could not be reconstituted soon enough to participate further in the attack. RAND analysis at the time of the Gulf War showed that sustaining that level of interdiction on a daily basis should be sufficient to halt an Iraqi invasion (or anything similar) virtually in its tracks. It is this characteristic—the capability to stop a large-scale armored attack that occurs with little or no warning while operating from bases removed from the theater—that makes the bomber force in general and the B-2 in particular unique.

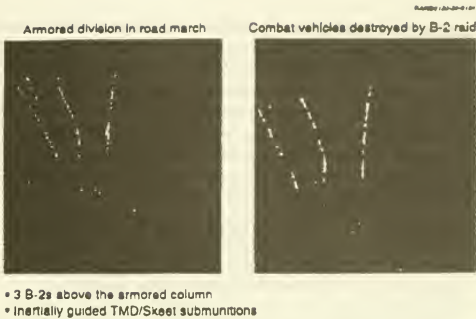


Figure 2—Potential B-2 Effectiveness in Armor Interdiction

How Many B-2s?

As Figure 2 shows, a small number of properly equipped B-2s in the right place at the right time could be extremely effective. However, a much larger B-2 force would be needed to assure that effectiveness. Figure 3 shows why.

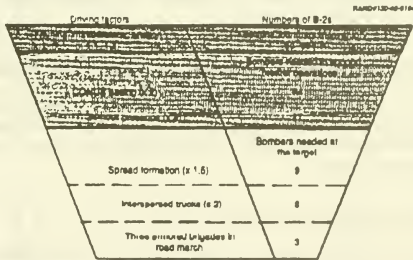


Figure 3—Conventional B-2 Antiarmor Operations—What Drives B-2 Force Levels?

Although three B-2s might be adequate if the enemy "cooperates"—i.e., bunches its armored vehicles and moves in a tight formation—more bombers could be needed if a prudent adversary were to take even the simplest countermeasures such as spreading its columns and interspersing less valuable vehicles with its tanks. That could triple the number of B-2s required because of limitations of the Skeet submunitions. In fact, this is probably the most reasonable "base case" to consider. The equivalent Skeet munitions effectiveness that results is much more consistent with the standard values used in the defense community than the more optimistic case where the adversary is essentially inept.

Since the bombers need to be able to respond whenever the enemy chooses to move, that means the force needs to be sized to maintain a continuous presence, which would again triple the size of the bomber force that is needed. Being able to operate for a time from bases in the continental United States—a basic attribute of long-range bombers—would approximately double the number of bombers needed. Adding in another 10–20% for training, maintenance, and long-term attrition leads to a total B-2 force of around 60 bombers for this single critical class of mission!

Thus, there is certainly an analytical argument for a larger force of suitable equipped B-2s if the U.S. wants to have the capability to halt invasions in distant theaters with very little warning or other military support. However, there are other dimensions to the problem. Cost is the obvious one, but there is another key issue that we will explore later: the amount of time it takes to procure additional B-2s. When they might be available is a key factor in evaluating the wisdom of investing in additional B-2s.

Options for Making a Smaller B-2 Force More Effective

With the current buy of B-2s limited to 20 and the possibility of procuring more on the table, exploring options for enhancing the effectiveness of a small force of B-2s needed is particularly important. Figure 3 suggests possibilities, which are summarized in Table 1.

Better Antiarmor Submunitions

Using better technology could improve the effectiveness of a small bomber force. Better antiarmor submunitions than Skeet could reduce the number of bombers required by as much as a factor of three, which could reduce the number of B-2s needed for antiarmor missions to roughly the 20 currently planned. Whether that much improvement can actually be achieved in practice remains to be

Table 1
Options for Increasing the Effectiveness of a Small B-2 Force

Option	Desired Effect	Issues
Better Antlarmor Submunitions	Double or triple the potential effectiveness of the bomber force	• Submunition effectiveness needs to be demonstrated (technical issues) • Cost • No current Air Force program • No planned Air Force procurement of alternative submunitions (e.g., BAT)
Forward Basing	Double the effective bomber sortie rate	• Base locations • Basing rights • Ramp space and POL • Repositioning or rapid deployment of weapons, spare parts, support equipment, and maintenance crews • Base security
Supplementing B-2s with B-1s	Provide additional firepower	• Approximately 3 to 1 payload disadvantage • B-1 survivability • B-1 targeting • Modifications to both aircraft • New and complex operational concepts

determined. For example, using the BAT¹ submunition is a possibility. So is the Low Cost Antiarmor Submunition that the Army and Air Force are jointly developing.

Forward Basing

Moving the bombers to forward bases after the initial sorties could reduce the number of bombers needed for sustained operations by about a factor of two. That would require either prepositioning weapons, spare parts, and fuel at key bases or airlifting them there at the outset of the conflict. The latter option may be viable for large theaters (e.g., Southwest Asia) where losing some ground to an attacker initially might be acceptable.

Using the B-1 to Supplement the B-2

New operational concepts might allow B-1s to provide some of the additional firepower necessary. That might prove feasible if the B-1s can be used in a relatively benign air defense environment. That could involve.

- Using the B-1s on the periphery of the enemy's country out of range of most home and air defenses
- Relying on the B-2 to suppress particularly lethal surface-to-air missile (SAM) defenses
- Depending on external sources (perhaps the B-2, since it has to solve these problems for itself anyway; perhaps other sensor platforms) to provide targeting data and help the B-1s avoid enemy airborne interceptors
- Arming the B-1s with short range standoff weapons (e.g., JSOW) to avoid short-range mobile SAM defenses

This is a difficult operational concept to implement, but it is the kind of thing the United States will have to do in the future to take maximum advantage of a long-range bomber force of limited size. Moreover, the B-1s pay a substantial payload penalty in the antiarmor mission for having to stand off to avoid short-range SAM defenses. It would take about 50 B-1s to provide the equivalent antiarmor capability of 20 B-2s. Thus, while using the B-1s to supplement the B-2s offers some real advantages, it also has some practical limitations, particularly if the B-2 force has to bear the additional burden of suppressing defenses and orchestrating the attack operations to help the B-1s penetrate.

¹ Brilliant Antiarmor (BAT) is an advanced submunition currently being developed by the Army.

Combinations

Obviously, some of these options make sense to consider in combination. Better submunitions would help all of the bombers. Using the B-1 as effectively as possible is certainly cost-effective since the United States already owns nearly 100 of them. Forward basing would help, too, when it is practical, although it raises questions of airlift capability and prepositioning as well as ramp space limitations if large numbers of bombers and tankers are involved.

Making the Bomber Force Effective: Better Weapons and Modifications to the Bombers

Addressing the B-2 question is only part of the larger problem of providing an effective bomber force for the future. Regardless of whether or not the United States chooses to buy additional B-2s, it will have to make changes to whatever bomber force it retains if that force is to be effective. First, large quantities of better weapons are needed. Second, the bombers themselves, including the B-7, need to be modified. Some of these improvements are funded; others are not.

Better Weapons

Equipping the bombers with better weapons is a prerequisite for making whatever bomber force the United States retains effective. This is not a tradeoff. Our analyses have shown for years the relative importance of better weapons for bombers. Without better weapons, any of the bomber force options that the United States is considering will be of only limited value.

Table 2 summarizes the combinations of weapons and bombers that our analysis has shown to be the best choices. Note the differences between the weapons required in the early phases of a conflict when the bombers must cope with largely intact air defenses and the later phases of a conflict when the U.S. may enjoy the luxury of air superiority. *That's why the planning assumptions about how bombers are to be employed are so critical.* If the United States wants to realize the potential of the long-range bomber force to react rapidly to a crisis, it will have to arm bombers accordingly. *Not currently funded, for example, are the following weapons that bombers need.*

- Long-range cruise missiles, beyond a modest number of ALCM-Cs
- Smaller (e.g., 500 lb) variants of JDAM

Table 2
The Right Weapon Mix Is the Key for an Effective Bomber Force

Bombers Stage of the campaign	B-52	B-1	B-2
Early	Long-range cruise missiles^{1,3}	- Interdiction JSOW - Deep attack long-range cruise missiles	- JDAM 2000 lb 1000 lb² 500 lb - TMD/WCMD - Better submunitions - Short- to medium-range defense suppression weapon (e.g., JSOW/CEB)
Late	- JDAM 2000 lb 1000 lb² 500 lb - TMD/WCMD - Better submunitions		

¹ About 1000 nuclear ALCMs exist, some of which have been converted to conventional ALCM-Cs. Tomahawk cruise missiles have been flight tested on B-52s and could be adapted. Other proposals exist for new cruise missiles, but are not currently funded.

² The Air Force currently plans a 1000 lb JDAM variant, but only for use on the F-22.

³ Italics indicate that the program is not currently funded by the Air Force

JSOW ≡ Joint Standoff Weapon
JDAM ≡ Joint Direct Attack Munition
TMD ≡ Tactical Munitions Dispenser
WCMD ≡ Wind Corrected Munitions Dispenser
CEB ≡ Combined Effects Bomblet

Other problems relating to the bombers themselves would also limit the capability of the bombers to use them. In general, our analyses have shown the importance of having large numbers of moderately accurate, relatively cheap weapons of varying types and yields to take maximum advantage of the payload capacity of the bombers.

Modifications to the Bombers

All of the bombers, including the B-2, need modifications as well. The most critical modifications fall into three categories:

- Increased and more diverse weapons carriage
- Weapons integration
- Other electronics hardware and related software (e.g., sensor and communications upgrades, computer hardware and software improvements, displays and man-machine interface changes)

All these improvements are intended to help the bombers carry the largest possible number of various types of weapons and improve their capability to use information for targeting, mission planning, etc. as effectively as possible. Not all of the necessary modifications are currently funded. In particular, the following modifications that our analysis showed to be important are either not funded at all or only partially funded.

- Radar upgrades to the B-1 to improve its ability to engage moving targets
- A higher resolution radar for the B-2 to allow it to identify targets better
- A common weapons rack to ease logistics support for all of the bombers
- Internal modifications to increase weapons carriage
- Medium data rate communications systems to allow the bombers to receive standard intelligence data

Part of a general trend we see for the future is extending the life and increasing the value of aircraft by continuously modifying them. That is particularly important in the information arena where technology is changing so rapidly. The acquisition process needs to be flexible enough to accommodate rapid, continuing changes in technology in order to facilitate routine modification to weapon systems. As Figure 4 shows, the relative costs of modifications are quite modest compared to the overall costs of bombers in particular, and the payoff is substantial. In particular, the cost of additional modifications to the bombers that

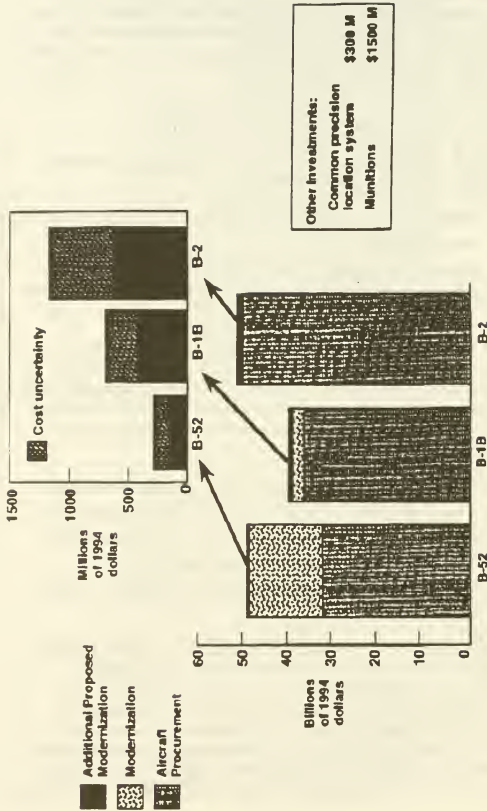


Figure 4—Modernization Represents a Relatively Small Part of Bomber Costs

are described above and are currently unfunded are almost negligible compared to the cost of the bombers themselves. On the other hand, some of the options that are funded appear to be more expensive than necessary if the bombers are used in appropriate ways.

Time Lags

Figure 5 illustrates the real problem with developing an effective conventional bomber force, however: the amount of time required to introduce the planned new weapons into the inventory. The improved weapons do not begin entering the force in significant numbers until around the turn of the century.² Until then, the bomber force will have very limited conventional capability regardless of how large it is. Even after the weapons began to enter the force, the stockpile will only be large enough to provide the bomber force with a very limited capability during the critical early phases of a major campaign. The development times for even the modest improvements (e.g., adding inertial or inertial/GPS guidance kits to existing weapons) are simply too long. Moreover, most of these weapons need to be procured in very large numbers, particularly since all elements of the U.S. forces need them.

The state of the bombers themselves makes the problem worse still. According to the current schedule, the modifications necessary to make the bombers—particularly the B-2 since it is only now entering the force—fully effective for conventional operations will take years to complete. Moreover, as noted earlier, some modifications that our analysis has already identified as important are not currently part of the plan, and it is likely that other modifications will prove necessary as well.

Timing is also an issue if the option of procuring additional B-2s is to be pursued. Depending on the production rate, the fortieth B-2 might not enter the force until the latter part of the first or the middle of the second decade of the next century. If those B-2s were the “stock” Block 30 models, they would be of limited value. However, even if they were updated along the way, the basic stealth technology in the airplane would be decades old before the last aircraft became operational. That raises a basic question about whether the B-2 would still be viable enough to justify the investment. If more B-2s are to be procured, acquiring them faster would

²Actually, the picture is even slightly worse than it appears because the weapons numbers shown are based on the total procured each year. Actual delivery of the weapons typically lags procurement authorization by about a year.

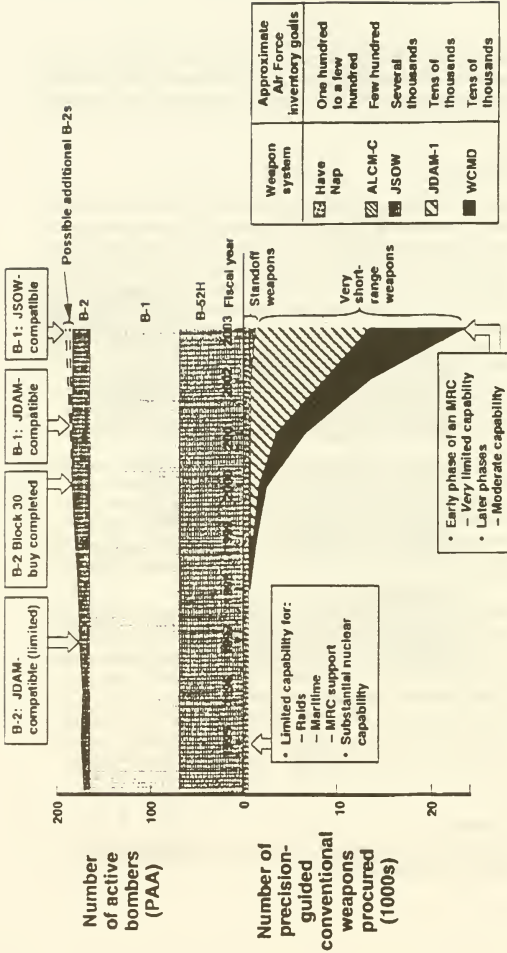


Figure 5—The Planned Bomber Force Will Have Very Little Capability in This Century

certainly be desirable, although that could pose serious funding problems. *Faced with that dilemma, the possibility of spending the money differently (e.g., trying to develop much "smarter", cheaper standoff weapons) needs to be seriously evaluated*

Finally, from an operational perspective, there is a significant mismatch between bombers and weapons that extends into at least the early part of the next century in the current plan. The first new weapons to come into the force in quantity are very short-range weapons—2000 lb JDAM-1s and WCMDs. While these weapons would be suitable for any of the bombers to use after the United States established air supremacy in a major conflict, only the properly modified B-2 could use them safely during the early phases of a conflict. That substantially limits the amount of firepower that bombers can bring to bear early in a major war, particularly since only JDAM-1 would be available in this century for attacking fixed targets. Moreover, the B-2s themselves are not likely to be optimally configured by the year 2000 to use these weapons to best advantage.

Standoff weapons are going to be in short supply in the programmed force, particularly in this century. JSOW is an appropriate weapon for the B-1 if it can be used effectively along with the B-2 in early interdiction roles. It will not be of much use to the other bombers, however. Also, until both the B-1 and the B-2 are modified to permit cooperative targeting,³ even the B-1/JSOW combination may be of limited utility.

Moreover, funding the ALCM-C provides a modest force of long-range conventional cruise missiles for either the B-52 or the B-1 to use for deep strikes against critical fixed targets in the early stages of a war or on limited raids. However, even with the planned ALCM-C conversions funded, only a few hundred missiles would be available for B-52s to carry, which is only enough for use in isolated situations, such as the recent raids in southern Iraq. Thus, a new weapon program or Air Force adaptation of other existing long-range cruise missiles such as Tomahawk is likely to be needed.

Thus, the problem that time lags cause in matching bombers and weapons can be summed up as follows:

- The planned weapon buys are most appropriate for a force dominated by B-2s, but the planned B-2 force is very small. Moreover, using the B-2 force effectively for anything other than strikes against high-value fixed targets requires modifications to the bombers that either are not in current plans or come along very late in the program.

³This is an operational concept that we proposed in some of our recent studies.

- The absence of suitable standoff weapons for the B-1 and B-52 seriously limits the effectiveness of the bulk of the bomber force until later stages of the war when air superiority has been established. Equipping the D-1 with JSOW is only a partial solution.

In spite of the considerable progress that the Air Force has made in recent years in improving its conventional weapons programs, *more progress is needed* if it is going to use its declining force of aircraft, particularly its long-range bombers, as effectively as possible. As a result, the bomber force, as currently planned, will have great difficulty providing the unique capabilities inherent in long-range bombers. At best, achieving those capabilities will require many years.

Potential Effectiveness of the Bomber Force with 20 B-2s

Figure 6 shows how a modest-sized force including 20 B-2s could be employed in a stressing major regional conflict.⁴ If the bombers were all fully modified and suitably armed, they could be effective in halting an armored invasion, suppressing key enemy air defenses, attacking critical airfields, and destroying time-urgent tactical and strategic targets during the initial phase of the campaign under favorable conditions. As more tactical forces arrive in the theater, a small number of bombers (mainly the B-2s) could be released for duty in another theater, while the rest of the bombers remain to participate in combined operations with other forces for the duration of the campaign.

However, such a modest force would be relatively fragile. It would have:

- No reserve force for nuclear use (= 40-50 additional B-52s would be needed)
- Very little margin for attrition
- No margin for tradeoffs of long-range bombers against other types of forces (e.g., B-1s against tactical fighter-bombers)
- No extra firepower to compensate for unexpected situations such as operational countermeasures by enemy maneuver forces (up to ~ 40 additional B-2s could be needed)
- Only a limited capability to support a second major regional conflict, although few of the "second" conflicts currently being considered would particularly stress the bomber force

⁴ The particular generic scenario shown is based on a composite of eight different actual regional situations, combining some of the more stressing features of each.

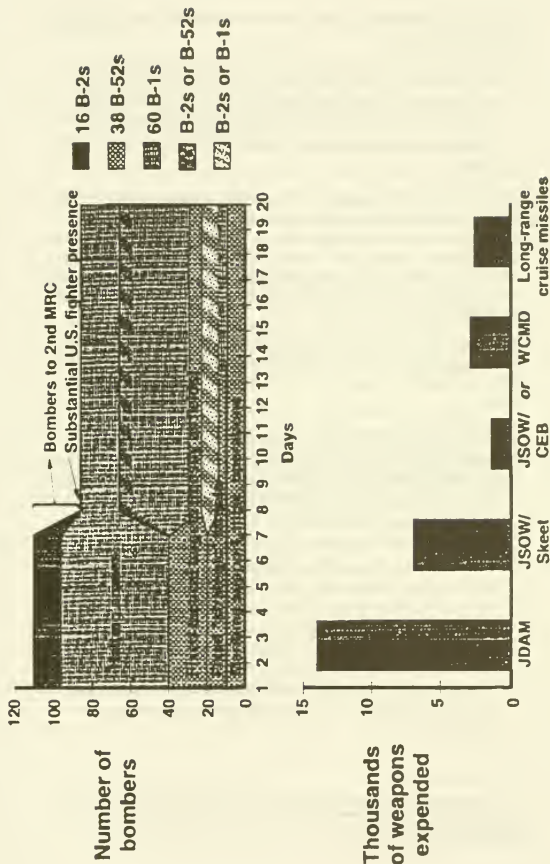


Figure 6—Employment of a Modest-Sized Bomber Force in a Major Regional Conflict

Retaining more B-52s and B-1s in the active force could alleviate some of those problems to a degree:

- The additional 30 or so B-52s could provide some nuclear reserve.
- More B-1s could provide some extra firepower early in the campaign—although their payload capacity is still limited by the need to use standoff weapons—and somewhat more firepower to tradeoff against other forces later.

More B-2s would add robustness in the early phase of the campaign and more firepower and flexibility for dealing with a second major regional conflict. For example, in this particular campaign, the need to employ large numbers of B-1s early on against invading armies required diverting all 16 available B-2s from interdiction missions to defense suppression to help the B-1s survive. Having more B-2s available would allow them to be used directly against the armored and mechanized attacking forces.

More fundamentally, the bomber campaign illustrated in Figure 6 demonstrates yet again the stark difference between the nature of the bomber force needed in the early phase of a campaign and that required later when the rest of the forces arrive:

- B-2s make their most critical and unique contribution early using their payload and operational advantages most effectively. In the later stages of a campaign, B-2s would, of course, be effective, *but generally would no longer be cost-effective* except perhaps for highly specialized missions when compared with other options. Thus, *scenarios that do not involve early autonomous use of bombers do not capture the principal value of the B-2.*
- B-1s, which can—if equipped and used properly—play a role in both phases of a campaign, are particularly well-suited for combined operations after other forces are deployed to the theater and the U.S. can achieve air superiority. Then, the B-1, which is basically a larger fighter-bomber, can take full advantage of its payload capacity⁵ and flight characteristics, which allow it to operate well in conjunction with fighters in a tactical environment. Thus, *B-1s will always look cost-effective compared to the B-2—and possibly to other types of tactical forces—in scenarios that emphasize long warning and preparation time.*

⁵If the bombers are limited to currently planned weapons carriage options, the B-1s look even better in some comparisons. However, that is an artifact of earlier design choices and biases comparisons among bombers. In our analysis, we have assumed high capacity weapon carriage modifications to all three bombers.

Conclusions

- If the nation wants to be able to halt very large-scale, short-warning attacks anywhere in the world, including places where the U.S. does not have forces already in place, then buying more B-2s is an attractive, albeit expensive, option. If not, the need is much less compelling. *In any event, the need for more B-2s is governed almost entirely by scenario assumptions.*
- All of the options for using bombers autonomously to halt invading armies are operationally and technically demanding and involve considerable risk.
- Buying large quantities of advanced weapons and modifying the bombers themselves are prerequisites for developing an effective bomber force, whatever its composition.
- Because of the projected time lags in procuring the needed weapons and modifying all three bombers, the conventional bomber force will remain relatively ineffective into the next century *no matter how large it is.* Moreover, extending the procurement of additional B-2s over too long a period of time could call into question the long-term viability of the aircraft's stealth technology.
- A key question remains unresolved: the tradeoffs between long-range bombers and other forces. It may turn out that retaining a larger bomber force including more B-2s at the expense of other types of forces could prove cost-effective and offer the United States new strategic options. The analysis to support or refute that hypothesis has yet to be done.

Mr. HUNTER. Mr. Buchan, thank you. And I want to thank the panel for really addressing across the spectrum practically every issue that affects our decision whether or not to buy more B-2's. Thank you very much.

Let me look to my Republican side and Democrat side. Mrs. Harman, we're going to have you and Buck McKeon, since you have both gone far beyond the call of duty in sticking around so long, I thought I would defer to you for initial questions.

If either one of you is ready, would you like to ask some questions?

Mrs. HARMAN. I'd be happy to. I know I was standing up and sitting down, but I guess we all become well versed in doing three things at once here. And I was listening to all of you, and I'm very impressed by the detailed arguments which I share in support of the B-2.

My question is this, and if Norm were still here I would ask it to him, too. The impression I have is that most people who study the B-2 support it, and not only support 20, but support 20-plus.

The problem comes with displacement, which is what that chart visualizes, and cost. I think those are really the problems. It's not a question of, is it stealthy, will the munitions be delivered more effectively, are there advantages from operating out of CONUS, et cetera.

It's a question of what do we have to give up, and there's the chart, or how much added cost is it. And so what I thought I would just like to ask you to do in a few minutes is perhaps strategize with us about what we really—the tough question: What should we really give up? What is outdated, what is less useful? How could we articulate a buy strategy for more B-2's, up to 50 or—pick a number—that would end up costing us something we could afford, or maybe costing us nothing, and that would end up displacing the right things to displace.

Because I think when the political argument is finally framed, that's how it will be framed.

And the final point, Norm was careful to say a low level buy. He kept saying that. I know he's saying that because in political terms there may not be money or will to buy more. But I do want to ask you to give us the right answer in terms of whether a low level buy is the best way to buy more B-2's.

So it's those two questions. And answers from any of you would be great.

General HORNER. Let me answer the first part, with regard to displacement, because obviously that is an important issue, as you know.

I think what we have to do is we have to look to the future, as to how we intend to fight our wars, because while Desert Storm contained a lot of time-honored ways of doing business—force on force—things of this nature, there were elements within Desert Storm that are not often cited, which really point to the future in warfare, and the way the United States should fight its wars, should it come to that.

There's some activities, such as the Battle of Kafji is an excellent example, the taking down of the Badger bombers that were

being loaded with munitions, certainly the shoot-down of the Mi-rages.

But all of them talk about the ability to react rapidly on a non-linear battlefield. And that's what I think we're going to face in the future. And we have to be able to take this tremendous—it's now the buzzword—information operations—but the tremendous amount of surveillance we have of the modern battle space, the amount of overhead information, the ability to take computers and communications and mesh together, bring to each member of the battle information about his situation and how best to employ his weapons.

We talk about brilliant employment nowadays, and that's nothing more than taking the American entrepreneurial spirit and utilizing it by empowering those individuals. And finally, rapidity, being able to get to the battle quickly, so it doesn't spread, or it doesn't grow, and then totally dominating the enemy in every facet. And we did that in Desert Storm.

Now, what does that mean? Well, for example, on the Army side, a division in World War II of men. We know that the soldier of today has far more lethality than the soldier of World War II. So why don't we look at making a division of, say, 800 men. And what are the advantages we accrue from that? It has the same devastating power on the battle field, but suddenly now you're facing an enemy who has—

Mr. HUNTER. General, did you mean 800 or 8,000?

General HORNER. Eight hundred, or eight thousand. I don't know the answer. But something less than 15,000. Today we keep defining them the way we did in the past. And we need to break that mold.

And when the enemy has surveillance of the battle field and precision munitions, which we can expect in the future, it will be important that that division be able to disperse and come together quickly. And 800 or 8,000 can do that at least twice as fast as 15,000.

Then look at the savings in personnel costs, the savings in training, the savings in all the things that we do for the families of the military. So we have the equivalent of a division, but we've technology and information to it, and so we can fight it more efficiently. And suddenly the cost of the division declines rapidly.

Now, that's going to take a change in mindset in the Army. But there are bright young people out there, and they will see these kinds of things.

We look at a supercarrier. It's operated by 11 people. We look at an aircraft carrier, it's operated by 5,000 people. Well, suppose we say 3,000 of those are there to arm and equip airplanes and maintain them. So now, the carrier of the future, let's look to a 3,011 man carrier, rather than a 5,000 man carrier. The idea being here is again the costs associated with the manpower.

And also, there's inherent costs, because there's a big difference between losing, say, 11 people when a ship is sunk, versus losing 2,000 people when a ship is sunk. So those are the kinds of trades that we're going to have to start doing.

We're going to have to think in terms of fighting on our terms, maintaining the initiative because we have superior surveillance,

we have superior precision, we have people who can react and think on their own.

And that is how we're going to be able to afford systems that we need, like the B-2, in the overall military. But it's going to require tremendous courage on the part of each of the services to come to grips with these problems. But they're going to have to.

Mrs. HARMAN. Other answers to the question? General Horner, you focused on manpower, but there's also the issue, obviously, of early retirement of some of the aged bombers, like the B-52, and some other things that go with the life cycle costs that the Pentagon loads on some of these types of buys, et cetera.

Mr. DICKS. One point I would make is if you have an adequate, or significant, robust B-2 force, that means you don't have to have as much of the suppression aircraft. I mentioned this in my statement.

You know, you've got the chart right over here, of what you have to have when you're using nonstealthy aircraft. And a lot of those things are suppression, air escort and other things.

You know, tankers. Let's look at the tanker force you have to have to support all those airplanes. So by moving to a more stealthy fleet, you, in essence, free yourself up from all these other aircraft needs.

And somebody will say, well we've already bought them. Well, that's fine, but as we—some of the older planes will go out, and as you add these planes, you don't have to replace them.

I mean, I just think there's a tremendous savings there, and all the personnel associated with that as well.

And, again, one of the other things that I think is also important to think about is how many lives are we putting at risk. You know, when Captain O'Grady goes in in a nonstealthy airplane and gets shot down, then we have to send 50 Marines in and helicopters and ships and everything else to rescue him.

If he had been in an F-117, the Air Force tells me he probably wouldn't have been shot down in the first place. So, there's a tremendous amount of lives that I think can be saved by moving towards a more stealthy force, versus this.

As I said, I support aircraft carriers. I know the chairman supports aircraft carriers, and we both come from communities that are big, major Navy communities. And we're not against the Navy.

But we think we ought to have an airplane coming off those carriers that's long-range and stealthy for the future, because then you don't have to have all those suppression planes and all the other things that have to be there to protect the planes, the few planes that wind up dropping bombs on enemy soil.

Mr. HUNTER. Mr. Dicks, we've touched on this point. And Mrs. Harman's question, I think, opened up this, I think, important factor in the discussion. And, General Horner, maybe you could give us an estimate.

A lot of those planes, the support aircraft that are indicated in that chart are gone, because when we prosecuted Desert Storm, we had, what, 23 fighter air wing equivalents, is that right?

General HORNER. Yes, sir.

Mr. HUNTER. Today we have 13. So we've cut roughly 40 percent of our air power. At least that's what I come up with mathemati-

cally. Is that—and so if you require large numbers of support aircraft to accompany a few bomb droppers, we have already, not as a result of any creativity on the part of the services, but as a result of hard number crunches and defense cuts, we've eliminated 40 percent of those aircraft that are on the left side of that chart already.

Where would you place our air power if you were going to give us in Congress a rough estimate of what percentage of the air power we have today as compared with the days of Desert Storm? What have we done with our air power?

General HORNER. Well, I don't think there's any doubt about it. We would have difficulty fielding the force today that we fielded in Desert Storm. That's neither good nor bad. That's the way things are.

There's also no doubt about it that we have started to cut on the margins systems that were old, like the Wild Weasel aircraft, F-4G's, and yet we see even today over the southern no fly zone, they're having a need for defense suppression aircraft. And of course, the answer was the deployment of the F-117's.

So the answer—I'm a little bit reluctant because too often people want to trade airpower for airpower, air force for air force, and while I have no problem with making those kinds of hard decisions, I think we have to take a look at our land, sea, air and space forces and make the appropriate trades as to what is most relevant for the warfare of the future.

And I think if you had to identify things, there's no doubt about it, B-2 stands up as the system of the future. And there are other systems that we've brought with us over historical times that probably have less merit in terms of how we would want to fight the war in the future.

So I'm having a little bit of trouble trading airpower off for airpower, because I think Desert Storm showed the importance of airpower.

Mrs. HARMAN. Mr. Chairman, would you yield on that point?

Mr. HUNTER. Certainly.

Mrs. HARMAN. I think that is such an important statement that General Horner just made, and I think that this committee can insist that the trade be viewed in the broadest context.

And I think that if we do that, we will end up with an environment much more favorable to a B-2 buy than one that just compares this airplane to that airplane. Because when I was talking about displacement, I was thinking now just in terms of what could you take out to replace with what, but the resistance that automatically comes from the Air Force, which I think has been a large part of the problem here—some in the Air Force—to, gee, this is my pet rock, and I don't want your project instead of mine.

Mr. HUNTER. Well, I agree with that, but I think there's one thing we have to do also, and that is to not presume that the cuts, the massive cuts we've taken in our military strength are appropriate.

And I think it's important to remind ourselves that we are spending now a smaller percentage of our gross national product [GNP] on defense than we have at any time since Pearl Harbor, that we've cut our airpower from 23 fighter air wings to 13. The

Army, General Horner, whether they like it or not, and no matter they divide up the divisions, has gone from 18 divisions to 10. And the Navy, from approximately 550 ships to approximately 350 ships.

So perhaps the answer is that we need to spend a little more money on defense, and if we spend that little more money on defense the best investment might be long range airpower.

We've already made some big tradeoffs. The problem is that the defense forces have gotten nothing for the sacrifices that they've made.

Mr. DICKS. Mr. Chairman, I would say another thing, too. I think we have to focus on stealthy aircraft, too, especially in the attack mode, because they are the planes that can operate without the need of the jamming and the suppression and the other things that go along with it.

So as we look to the future purchases of aircraft, in my mind, stealthy planes have to be right there at the top. We're buying a lot of things that aren't stealthy. So I think we have to look at that area as well.

Mr. HUNTER. I want to let the other members have a chance for questions. Let me ask Mr. McKeon and then Mr. Sisisky if they have any questions of this panel, and then we'll go around again and we'll just keep the discussion going. Mr. McKeon.

Mr. McKEON. Dr. Buchan, you talked about reducing by a factor of three the—can you tell me exactly what you were talking about?

Mr. BUCHAN. Yes. There were several factors of three floating around. I think the one you're referring to is the factor of three reduction in number of bombers required if one can use nonstandoff weapons, if you will.

Mr. McKEON. That was it. And we can relate that to what's going on right now. The cruise missiles that are being used over there. We shipped them out one night, and we shipped them out again, and we still, apparently have not taken care of all of the targets. I understand we've used about—what, 72 now?

Mr. BUCHAN. Yes.

Mr. McKEON. One B-2 could carry 16 of the [JDAM's], as Mr. Dicks was saying. And that's \$208,000. And 16 of the cruise missiles are \$19 million. So 72 of them, you know, we start figuring up, we can be spending a lot of money there really quick.

Mr. DICKS. We don't have very many of these cruise missiles either. That's another problem.

Mr. BUCHAN. That's also true.

Mr. McKEON. Well, I think, General Horner, you were ordered to stop using those because of cost during the war, and had to use the B-52's with the dumb bombs, right?

General HORNER. During the gulf war, we used the cruise missiles very effectively to provide an initial surge. As we continued to targeting them, one night I was called in to General Schwarzkopf, and said, stop using the TLAM's, the Tomahawk missiles.

And I said, fine, because quite frankly, the requirements in immediate targeting had gone down, and I said is there a reason for that, and he said cost.

Mr. HUNTER. That's the same reason we cut these programs. Cost.

Mr. DICKS. I want to ask—I was told.

Mr. McKEON. If I can finish on that question.

Mr. DICKS. On this point.

Mr. McKEON. What does—those missiles, what can one missile do compared to one JDAM?

Mr. BUCHAN. One JDAM, at least at the current variety, is considerable more effective, because it's got a much larger warhead.

Mr. McKEON. So that plays into your reduction by a factor of three?

Mr. BUCHAN. Yes, but it's a second order effect. It can become much more important in particular instances. In fact, actually, one of the things our analyses showed is that one of the particular advantages of B-2's is not so much carrying 16 2,000 pound bombs as a much larger number of small, accurate bombs.

The net effect is much more dramatic.

Mr. McKEON. These targets that we've shot the cruise missiles at now, how many targets, do we know how many targets they've shot at over there?

Mr. DICKS. Seventy-seven, I think.

Mr. McKEON. Some were duplicates.

Mr. BUCHAN. Yes, those—

Mr. McKEON. Maybe 40 targets?

Mr. BUCHAN. I forget. Some small number of tens.

Mr. McKEON. So you're saying some of the smaller bombs that could be dropped from the B-2 could have taken out what a cruise missile may or may not have taken out?

Mr. BUCHAN. Yes; and there's another thing, too. This is almost a tertiary point. When one attacks, say, a relatively large complex, like either a command and control center, or—at least some of the sort that we've seen in Iraq—or, say, an industrial facility, there are two different ways one can go at this.

One can either try to identify particular critical points in the building, and you may or may not get that right, depending on how good our intelligence is, and try to hit those precise points with a cruise missile or perhaps a JDAM, or the current kind of JDAM that we're talking about.

Or we could take a large quantity of, say, 500 pound JDAM-class weapons and just obliterate the facility. Now, that's one of the things that one can do with a B-2 that one cannot do very cost effectively with standoff cruise missiles, say.

It removes a large bit of the uncertainty in whether one destroys the target or not.

Mr. McKEON. How many of the 500 pound bombs can it carry?

Mr. LAWLER. Thirty-two.

Mr. McKEON. Thirty-two.

Mr. BUCHAN. How about with increased carriage?

Mr. LAWLER. With increased carriage, you could carry 40,000 pounds worth.

Mr. McKEON. What does that do to the stealthiness.

Mr. LAWLER. Nothing.

Mr. BUCHAN. Nothing.

Mr. LAWLER. They're all internally carried.

Mr. McKEON. So it could carry, then, with increased—can carry how many? Eighty?

Mr. LAWLER. Eighty.

Mr. BUCHAN. Eighty.

Mr. LAWLER. Eighty if you have the correct bomb carriage.

Mr. McKEON. And we don't have these bomb carriages right now, and we don't have enough of these weapons right now?

Mr. LAWLER. We have bomb carriages that will carry the 500 pounds. We don't have them that are smart that can download the instrumentation into them. So that's a—that's one of the things that has to be developed, is a smart bomb carriage.

Mr. McKEON. Right.

Mr. LAWLER. Now, there are companies working on those, so it's just a matter of integrating them into the weapons system.

Mr. McKEON. Thank you.

Mr. HUNTER. On that point, before we get off the cruise missiles, there was a rumor going around that the reason that a number of the cruise missiles went into southern Iraq, even though the invasion into the Kurd areas was in northern Iraq was because we didn't have sufficient mapping capability to direct our cruise missiles in the northern areas.

Does anybody have any information on that?

[No response.]

Mr. DICKS. Mr. Chairman, could I make just one point?

Mr. HUNTER. Sure.

Mr. DICKS. When I was at the Skunk Works they told me that their information was that during the gulf war, and General Horner tried to recall, but sometimes they had to target six Tomahawk land attack missile [TLAM's] on one target.

Now, think about that. That's \$7.2 million compared to \$13,000. I mean, that is an incredible difference.

And the other thing I'd mention about the B-2, you have 16 bombs, 2,000 pound bombs, all of which are individually targetable, and can be retargeted once you're in over the target base.

So if a long-range cruise missile knocked out one of these things, and if it's on your list of things to hit, you can change that and redesignate another point to attack.

So there's incredible flexibility in how you utilize those 16 2,000 pound precision guided munitions.

Mr. HUNTER. Let me ask you another followup. General Horner, if you had had B-2 during Desert Storm, would you have used it?

General HORNER. When I came back, I started talking about the B-2, and somebody said, why are you so enthusiastic about the B-2? And I said it's the one thing I wish I had had during Desert Storm, because we had so much. It's hard to find efficiencies.

But the one thing I wish I would have had was B-2.

Mr. DICKS. Especially in the first 10 days, the first 2 weeks, where you really still had to get control of the situation?

General HORNER. But the other thing about the B-2's, you've got to understand, is that as we improve our ability to surveil the enemy, as we improve our ability to understand what's happening out there, and react in terms of seconds now, instead of days, the decision time in the past of days, we need a system that can rove the battlefield unencumbered.

And can maintain the initiative for our side, to strike the enemy before he gets his initiative cranked up. And I talked about Takadoo. We got word that he's loading up Badger bombers at an airfield called Takadoo near Baghdad. That was a phone call from Mike McConnell who was Secretary Cheney's briefing officer, over to Buster down in the Black Hole.

Buster came running into the floor of the thing—fortunately we had the F-117, and we could divert them without worrying about all of the paraphernalia that goes long, and we struck—we got six of those eight Badger bombers while they were being loaded. We had it on the film afterward.

The Battle of Kafji. We didn't know what was happening in Kafji. We had been told that something was up. The Third Corps commander had been taken to Baghdad and came back, the Iraqi Third Corps commander. And we didn't know what it was, but Joint Star started seeing all this movement on the battle field.

And so we went after that movement, because we knew something was up, but didn't know what it was, and we killed the invasion while it was being born.

As a result, one brigade of Saudi armor defeated three Iraqi divisions. And that's because airpower was able to react rapidly. And we didn't worry about days of deciding and anguishing and milling the data. We just went after what we saw.

And that's why the B-2 is so important, is because we can rapidly react. It is unencumbered, it has the range to go throughout the battlefield, and it has the precision weapons in order to be very efficient.

Mr. HUNTER. If you would allow me, Buck, just for a second. The Pentagon has stated that since the B-2 has just completed developmental testing, but it hasn't done their initial crew training with their relatively inexpensive Global Positioning System [GPS] aided munition, the GAM—the first precision munition that will be carried on the platform—it could not have been employed in the lieu of or in concern with the \$1 million Tomahawks, and conventional air launched cruise missile [ALCM's] were used in the Desert Strike operation.

If GAM had been operationally ready, do you think it should have been employed against Iraqi targets.

General HORNER. Of course.

Mr. HUNTER. OK. Go right ahead, and then we'll go to Mr. Sisi-sky.

Mr. McKEON. Following up on the F-117's, how many of them were there in Desert Storm? How many of them did you have over there?

Mr. BUCHAN. Forty-four?

General HORNER. Well, it was all that we had really available.

Mr. McKEON. That's the answer.

General HORNER. I believe the number is forty-some.

Mr. McKEON. So you had all of them there. And basically—

General HORNER. There were others, but they were needed for training and support.

Mr. McKEON. But all of the available craft for duty were there. If, and this question has come up many times, if North Korea had decided to go into South Korea at that time, we had nothing.

General HORNER. That's right.

Mr. McKEON. I won't say—we had nothing in the way of Stealth aircraft to use over there. Again, back then, if we had the B-2's in these three bases around the world, we wouldn't have had to call on all of them to use at Desert Storm. We would have had reserves to use in other parts of the world, for rapid response for other crises.

OK. Thank you.

Mr. HUNTER. Thank you. Mr. Sisisky.

Mr. SISISKY. I would just say to my colleague, you still had the 7th Fleet over near North Korea. So, I mean it wasn't exactly that we were not able to respond to anything.

Mr. McKEON. No Stealth.

Mr. SISISKY. I didn't really come here to argue. Of course you raised my thing with aircraft carriers. My friend, Norman Dicks, knows I have a little thing to do with that.

Mr. DICKS. Passion.

Mr. SISISKY. But, you know, the one thing that worries me about the B-2, very honestly, is that it takes eighteen hours to get from CONUS—I think I'm correct in that, to get from CONUS to the Middle East.

Now, say we can park over there, at Diego Garcia. We don't know how long. And therein lies the problem. I couldn't believe, Dr. Buchan, you said that the cruise missiles couldn't obliterate a command and control section? I think they probably could.

Mr. BUCHAN. No. On the contrary—

Mr. SISISKY. I thought you said that.

Mr. BUCHAN. No, on the contrary, they can obliterate one particular part of it. If it happens to be the right part, that's great. If not, we're out of luck, and we had direct experience with that in the gulf war.

Mr. SISISKY. Hopefully we've gotten a little better with that. And, by the way, I read that they'll get the price down to one that's even better than they have now, down to \$283,000, which is still a lot of money.

Like I said before, I didn't want to get in any argument.

Mr. DICKS. Will the gentleman yield just for one point?

Mr. SISISKY. No, I won't—yes, of course.

Mr. DICKS. Just to comment. As you know, it was said here earlier today, we see carriers and bombers working together. I mean, I don't see this as an either/or proposition. Maybe at the margin, you know, then we have to decide where the best investment can be made. My view, stealthy airplanes have an inherent advantage.

Sometimes you don't have your carriers right where you want them either. It takes you a day or two to steam them into position in order to be able to use them. The question then becomes do you have a stealthy long-range airplane coming off those carriers that can operate autonomously and go in like the F-117 did against these most difficult targets.

Mr. SISISKY. We made a fatal mistake—

Mr. DICKS [continuing]. Without suppression.

Mr. SISISKY. We made a fatal, fatal mistake in this Congress and the Department of Defense, for \$3 billion we could have had an A12 that was more—and we spent \$19 billion. I opposed for 2 years

the E and F, not that I didn't think it'd be a good plane. I just didn't think it had enough lanes on it. But they said they worked some of that out.

I've been to the Skunk Works, and they've got a Naval version of the 117. I begged the Navy. Mike Boorda was, God rest his soul, was so thrilled about the 117. But there was one problem. And it's a problem in everything that we've got. They've got the money. We do not have the money.

Mr. Chairman, you remember—

Mr. HUNTER. You're talking about the \$3 billion research and development [R&D] head on it?

Mr. SISISKY. You remember when I said, with all the aircraft we've got coming on, F-122, the joint fighter, the E and F. We've got aircraft carriers. Do you know, the Navy, if you look at the Navy right now, 5 ships a year, 30 year life, is 150 ship Navy.

The seas haven't shrunk any. I mean, this is scary. I went down to the decommissioning—it was the saddest day.

Mr. HUNTER. Can we get you on the Dole campaign? We need that speech around the country. Maybe Norm will help us, too.

Mr. SISISKY. He won't help me after that letter I just sent to him today.

Mr. DICKS. But would my colleague yield for just for a comment?

Mr. SISISKY. Wait a minute. I went to the saddest thing I've ever seen. It was a decommissioning of the U.S.S. *America* that was 31 years old. It was beautiful. That ship was beautiful. And we're retiring it, putting it up in moth balls, and somebody will get it as a memorial or something like that.

But the bottom line comes, I told this committee, I told the Department, we've got to find another way to fund things. To appropriate the money, and, here it is, maybe we need a mortgage. I'm not smart enough to know how to do it. I've tried to entice some of these corporations to find a way. Hire a consultant in accounting, of how we can fund these fundamental things that we need to keep the technical edge. And that's the real thing.

Because this whole thing isn't money. It's national security that we're dealing with. You know, I deal, almost on a daily basis, now. The new thing about the Department of Defense is privatization. And I believe that we can privatize some things.

But not wholesale. They want to do the whole damn Norfolk Naval Base, would you believe that? Privatize that. And I had to spell out in this room, there's only one reason that base is there. And we tend to forget. And I said I'll spell it for you. W-A-R.

But the only reason I got into this conversation when they mentioned carriers—

Mr. DICKS. Would the gentleman yield just for one point? I do think—and this is easier said than done—but the fact that we are going to have, as the General pointed out, a smaller military.

That in my mind means being able to take care of your technological superiority where you've got incredible leverage from Stealth, long-range and precision-guided-munitions, submunitions, bunker busters, standoff weapons, for mobile targets. I mean, you've got one platform here that has—you can literally go after four different kinds of targets, including advancing armored divisions.

And to me, when you look at any other weapon in the whole deal, there isn't one that even comes close to this potential capability. I say potential because we don't have the weapons on this thing yet. We aren't—don't have them all built yet. They're not out there yet with these weapons on there.

So it's all up to us to make sure we get those weapons on the B-2's, and then making sure we get enough of them to take advantage of this capability. The one thing that in studying this, sortie rate is a very important thing. And you've got to have enough of these to generate enough sorties in and out to take advantage of the Stealth and the precision-guided-munitions.

That's why having too few makes it a situation where you can't effectively use even the smaller forces.

Mr. SISISKY. Norm, I remember when you were fighting for the 20, a life-and-death matter.

Mr. DICKS. Well, you've got to get one fight at a time.

Mr. SISISKY. This scene shifts every year. And truly, the problem, we're going to pay for it, we've got to take it from something. You want to take it—you think the Air Force and the manufacturers are going to buy taking it from the F-122? Baloney. It's not going to happen.

Mr. HUNTER. Let me offer one suggestion to you.

Mr. DICKS. We're buying things that are not as effective as the B-2. What I'm saying to you, if I had to rank up every conventional weapon we've got, it would be No. 1. Nothing compares with it in terms of capability.

So somehow it's got to get funded. What we're saying is we're funding all these other things that are not as nearly as effective as the B-2, and we're not going to fund the most effective we've ever potentially had.

Mr. HUNTER. Let me take back the hearing for just a second. [Laughter.]

Let me pose a question to our panelists, because Norm and Jane have brought up the very difficult question of dollars. And you know, General Horner and Norm, I think that goes right to the cruise missiles. And when you've got the pragmatic statement by General Schwarzkopf, these doggone things are expensive, we don't have a proclivity to fund a lot of cruise missiles in this Congress.

But let me tell you what we do fund. We have—we've gone from 18 Army divisions to 10 Army divisions now, and I don't think the reduction made Stamp Collectors Weekly. Nobody cared.

We have 300,000 professional shoppers in the Pentagon. That's 20 divisions. And I've thought at one time of maybe naming the Big Red One Shopping Division, 173 Airborne Shopping Division.

If we took some of those 300,000 professional shoppers in DOD, those 20 divisions of professional shoppers, and reduced those divisions down to 10, we could purchase a lot more in terms of—we could save \$10 to \$15 billion a year.

When we torture ourselves over where we're going to find \$2 or \$3 billion for the B-2 program on an annual basis, that comes to mind. Could you—do you want to comment on that in terms of—is this pie in the sky for Congresses to always talk in a general way about reducing the DOD non-fighting bureaucracy, the tail, if you will, in the tooth to tail combination?

Is that just something that we talk about, but are never able to do politically? And, realistically, do you think it's something that should be done to provide for equipment purchases?

Mrs. HARMAN. And, Duncan, would you just yield for me to add something to your question? When I posed my questions before, I talked about life cycle cost, as computed by the Pentagon. And part of those life cycle costs include this enormous overhead that should be reduced.

But I think there are probably ways to come at this, in addition to the acquisition reform legislation we've already passed, that would yield enormous savings, and let our scarce dollars go directly into advanced weapons, rather than into more bureaucracies to contemplate purchasing advanced weapons.

General HORNER. Mr. Chairman, first, up front, I'm always—people are always trying to get me to trade carriers off against B-2's, and I refuse to do that. Remember, I'm the guy who had six carriers under him.

And I believe in air power. Now, that doesn't mean I don't believe in land power, sea power and space power, but I happen to believe air power is a relevant force for anything we want to fight.

With regard to the acquisitions, it's timely. This morning I was with the students down at the Armed Forces Staff College, and their question is when are we going to get the cost of acquisition down, when are we going to get our acquisition force to be more timely in what they do.

And Frank Kelso and I sat there, with Carl Steiner, and we all three kind of same answer. We said, the problem, first, this young man said the problem's with Congress because of all the legislation, and I said, look it, if somebody would get their act together and come over to Congress with a clear cut way of doing business, I said, Congress would not hesitate to pass that.

I told that what I see is I see a reluctance on the part of the Department of Defense, particularly the service acquisition agencies, to change. And I said, you've got to understand. They have a large civilian component to that. So when you talk about cutting jobs, you're talking about jobs. You talk about cutting military space, that guy just goes out to Oklahoma and fires a cannon. That's what he wanted to do anyway.

But when you talk about, so there's a reluctance on the part of the services, and it's understandable. It is not a selfish or un-American kind of thing. It's a normal bureaucracy kind of thing.

Mr. HUNTER. Well, General Horner, on that point, when we cut the Army from 18 to 10 divisions, we didn't ask our field commanders and our commander in chief [CINC's] to come up with ways to be more effective, and if that involved reducing the end strengths to do that.

We gave them reduced end strengths, and then we said, now, figure out how you're going to perform the mission with the fewer people.

The interesting thing about the procurement bureaucracy, the 300,000 shoppers, the 20 Army divisions of shoppers that we maintain, is that we've never done that with them. We ask them to come up with ways to be more effective, and this room full of folks was a business and everybody's job was on the line, and you di-

rected us to come up with ways to be more effective, we'd come up with a nice plan for you in 3 or 4 months, but you can bet when the smoke cleared every one of us would have a position in the plan.

Now, the interesting thing about the Defense procurement bureaucracy is it's not the cost that it imposes on the taxpayer by making acquisition of the system more important, it's the cost that it imposes on the taxpayer just by the general weight of the payroll of 300,000 fighting shoppers.

You take that shopping bureaucracy, those 20 divisions of professional shoppers, and look at the payroll that they bring to the Defense bill each year, the piece of the Defense bill they take, they would provide, if you cut that in half, that would provide for a complete B-2 program and many other things. Not by making any of your procurements more effective, or less expensive, but simply by reducing the shopper divisions from 20 divisions to a mere ten divisions.

So I'd like to have, as long as we've got this panel here, Dr. Buchan, Dr. Payne, and Mr. Lawler, do you have—this has always been the big bugaboo for Congress, how do you reduce the giant bureaucracy and the cost of acquisition. Do you think we should go to end strength cuts the same way we go to end strength cuts with our military?

Dr. Lawler, why don't you take it from there, and go right down the line here. And Norm does not get to answer this question.

Mr. SISISKY. Can I answer, too?

Mr. HUNTER. And then we'll go to Mr. Sisisky.

Mr. LAWLER. Mr. Chairman, when we try to cut overhead at my company, we decide how much we're going to cut and we cut it, and then we figure out how we're going to do business with the lower strength work force on our indirect.

I think you have hit the germ of an idea when you say you cut it the same way you cut divisions. You cut it, and then you figure out how you're going to get your job done with the lower strength work force.

That's the simple way that we do it. If you do a grass roots estimate, we wind up needing more people than we have now to get the job done, but if we say we're going to take a 30 percent reduction and we're still going to get our job done, we always find a way to do that.

Mr. HUNTER. Thank you. Dr. Payne?

Mr. SISISKY. I have a 4 o'clock appointment.

Mr. HUNTER. Go right ahead, Mr. Sisisky. I defer to my senior colleague here.

Mr. SISISKY. You raise an interesting point, and I just didn't idly talk about privatization. They would lay off Federal employees and privatize it in some other way, like they can save the money, that corporations are not for profit, they would just do this as a gratuity to the United States.

I have a very simple amendment, by the way. At least, I thought it was simple. I had an amendment to do away with DBOF, the Defense Business Operating Fund. Next year I'm going to do Defense Finance & Accounting Service [DFAS], the financial thing.

My argument to the Department of Defense is really very simple. See, you guys act like a bunch of Communists. You try to centralize everything in Washington. You should set the policy, do the audits, fine. Let the Army run the Army, the Navy run the Navy, the Air Force run the Air Force, and the Marine Corps, let them operate their thing. Give them so much money.

You won't believe this. You know what Defense Business Operations Fund [DBOF] is? I had the comptroller in, and they said the Navy owed it \$4.7 billion. I said this didn't happen overnight. Who is auditing this account? Seventy billion dollars a year. Do you hear me? Seventy billion dollars a year.

You put that back in the hands of the services, I know they wanted to control it, but you know what happened? Just like laying off all the procurement people. Just like we're going to save all this money in base realignment and closure [BRAC].

They were paying the BRAC over because they'd never figured right. And they were paying the BRAC out of the DBOF, charging to different services for fixing airplanes, for fixing tanks, and for shipping ships—they were charging all of that, demanding rates, to raise the thing up.

They'll find a way in someday or another to beat the system. But I said my thing was very easy. And I would want your support next year when I try to do away with DFAS, because the accounting system—they're only 6 months behind, nothing serious. Just 6 months behind in the accounting.

Plus the fact that I had told the deputy secretary, if you want to privatize, the first thing you privatize is accounting. That we have an accounting system that all the services have, that the Department of Defense has, that you could understand unfunded liability, everything else. They don't know. Nobody knows.

It's unbelievable. And therein lies the problem. If we could find a simple way. But do your accounting first, and then privatize the lawyers. You may not like this at Northrop, what I'm saying, because I can tell you my suppliers don't like it. But we never win a case because you've got the lawyer talent on your side, and it's in the contracts. And every time we go to court, we get messed up. Even if we hire private lawyers, which we did, on the A12, because entry going into there—I said if you want to privatize, privatize the lawyers, and privatize the accountants.

I guarantee you, if you go to the big seven and say work up an accounting system in 4 years. They'd work it up. And you're going to pay for it.

But anyway, with that, I've got to go to my appointment.

Mr. HUNTER. OK. Thank you very much. Jane, do you have any further questions you wanted to ask?

Mrs. HARMAN. No. I just think this was very instructive. But there's a lot of work to do, but I really appreciate General Horner's insight about how we have to look at this thing in a holistic way, and we can't just be trading off airplanes for airplanes, because that will lead to turf wars, and an inadequate conclusion.

So I thank you for holding this hearing now. I look forward to participating with you tomorrow at the de Tocqueville event. And I hope that in a bipartisan fashion the 105th Congress gets on with it, and provides for more B-2's.

Mr. HUNTER. Thank you very much, Jane, and thank you for your participation today.

Gentlemen, let me go to a few other questions. Bomber strength, bomber numbers, the administration had a problem, money problem, and the ultimate answer when we looked at the numbers that we required with the two-MRC strategy, the ultimate answer to that was to adopt this unique, and, I think, unprecedented policy or strategy of swinging bombers from one theater to another.

And I asked General Loh at the time whether or not that could result in higher casualties. He said it could. If you took bombers out of one theater, for example, out of the Korean theater and you moved them into the desert theater, at the same time you had a surprise armor attack, you could lose a lot of people before you got those bombers back there to help blunt that attack.

And I'm quoting from General Loh's letter that I will offer for the record.

[The information referred to was submitted for the record:]



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

OFFICE OF THE COMMANDER
205 DODD BOULEVARD, SUITE 100
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22 March 1995

The Honorable Duncan Hunter
House of Representatives
Washington DC 20515-0001

Dear Mr. Hunter

As a follow-up to our conversation of March 7, 1995, let me offer my thoughts on the risk of increased casualties that could occur if we need to swing our bombers from one major regional conflict (MRC) to another during a critical combat phase.

Our bombers are extremely important in the two MRC scenario. In the opening days of a short-notice conflict, our bombers will launch from home to provide the bulk of our combat firepower and ensure that we blunt the aggressor's attack. During the next phases of the conflict, our bombers will continue to play an important role in the attrition of enemy ground forces, allowing us to build an overwhelming force advantage and counterattack to regain lost territory with the least possible casualties.

Accurate casualty predictions are extremely difficult at best; however, should a second MRC cause us to swing our bombers to another theater before achieving this overwhelming force advantage, our counteroffensive would be delayed, and we would likely suffer more casualties over the course of the campaign.

My concern is that the swing strategy is untried and carries substantial risk - even with the 45-day separation between MRCs assumed in our Defense Planning Guidance. Should the two conflicts occur closer together, we may find ourselves in the situation I described.

I appreciate your concern for our nation's defense and request your continued support for airpower adequate to meet our future defense needs in an uncertain world.

Sincerely

A handwritten signature in dark ink, appearing to read "John M. Loeh", is written over the typed name.

JOHN M. LOH
General, USAF
Commander

Global Power For America

Mr. HUNTER. Accurate casualty predictions are extremely difficult at best. However, should a second MRC cause us to swing our bombers to another theater before achieving this overwhelming force advantage, our counter-offensive will be delayed, and we would likely suffer more casualties over the course of the campaign.

Let me start with General Horner and see if Dr. Payne and Dr. Buchan have any comments on that.

Remember, Dr. Payne and Dr. Buchan, you've got a question I want you to answer before you leave the room too, that you didn't get your half of the answer in on cutting end strength of the procurement bureaucracy, how we finally do that, before we all retire.

General Horner, on this swing strategy, how did it come about, is it a phony strategy, or a valid strategy, and what risk did you attach to it?

General HORNER. Well, of course, it's a function of the bottom-up review, the bottom-up review being an attempt to rationalize the money that was available in the post-cold-war world with the threat of that world.

There's no doubt in my mind that the swing strategy is sort of a band-aid given that they felt they could not afford an adequate bomber force and afford all the other things.

So there's some validity in it. But nonetheless it opens you up to tremendous risk. So I think that it really says that the bomber force is the most flexible element within your military power.

And then, if that is true, then you ought to have an adequate bomber force. So there's a chicken/egg relationship here, but I think the swing strategy really argues for more bombers, since it says it has tremendous flexibility across the whole engagement.

Mr. HUNTER. Do you think we're disserving our military personnel, and disserving the Nation to presume, to rely on a, quote, swing strategy. As I see it, if you look at the other elements of war making, this is the only element that's supposed to be swung back and forth between theaters.

Now, is that a gimmick that a staff guy came up with to avoid a couple of billion dollars on the debit side, or is that—is there a real and valid military justification for that?

I understand, you do it if you have to, obviously. You move your aircraft around. But are we taking a risk, in your estimation, to do that, to rely on that?

General HORNER. A cynic might say it was just a gimmick. But I'm not a cynic. I think there are valid reasons for it, but there's no doubt about it, you're increasing your risk, and you're jeopardizing American lives by that strategy.

Mr. HUNTER. Dr. Payne.

Mr. PAYNE. I certainly concur with General Horner's comment on that. If I might, I had a comment that goes back to the question that Congresswoman Harman asked at the very beginning which fits right in with the question that you posed, because it's a question of comparing force capabilities, and what kind of risks are we running.

And in comparing the B-2 to other capabilities, what we've been looking at in the discussions that we've had have largely been on

what kind of operational capabilities are there, are they adequate, so on and so forth.

Let me add a small point that may be important, and that is that as we go into the post-cold-war period, we have to look at, in fact, more than how we will fight future wars. And that's obviously an important question. But we have to look at more than that. We have to look at how we're going to deter future regional wars.

Now, a war fighting potential is an important element of deterrence. There's no doubt about that. But deterrence is a lot more than war fighting capabilities. So if we're thinking about the trade-offs purely in comparative terms, in terms of comparative combat potential, then we're missing something.

For example, we ought to look at how a capability is viewed by a specific opponent. Is it credible to that opponent? Is it deterring to that opponent? Does it threaten what that opponent values?

I mean all of these are huge questions with regard to deterrence. How does it contribute to addressing the reasons why our deterrence policies have failed in the past, and we have had deterrence policies that have failed. Why? How does a specific capability contribute to healing those wounds?

For example, what is the value for deterrence of peacetime show-the-flag-abroad opportunities that the B-2 offers, and how does that B-2 capability compare to other systems that can show commitment?

I guess what I'm getting at here is that deterrence isn't a sideshow in the post-cold-war period. Regional deterrence is going to be center stage.

I don't believe that there has been a single study dedicated to looking at how the B-2 can contribute to regional deterrence as an explicit element of looking at the value of the system.

Mr. HUNTER. I notice that's been a—you've dwelt on that theme for a long time, obviously because you think that is a very important element to inject into this analysis. And your testimony is that none of the analyses to date, except the rejected staff study that Norm cited, valued deterrence, to any degree at all.

Mr. PAYNE. That's right. Not to my knowledge.

Mr. HUNTER. And so you think if the committee were going to send recommendations for the assumptions, if you will, to the administration on this new, for this new study, that deterrence should be a criteria?

Mr. PAYNE. I would hope that it would become a consideration, a standard consideration in the way we compare capabilities.

Mr. HUNTER. OK.

Mr. PAYNE. Because, as I said, deterrence is center stage. It's now a sideshow.

Mr. HUNTER. I understand. Now, second, let me just follow on that for a minute. Another defect that you cited in these reports is the fact that you don't—that we presume warning. And your position was, I take it, we should presume surprise, be prepared, and that should be another modification of the classic criteria that goes into bomber studies. Why is that?

Mr. PAYNE. Well—

Mr. HUNTER. Common sense?

Mr. PAYNE. Well, it's clear, if you look at historical precedent, we know that opponents are highly motivated to surprise, and we know in lots of cases surprise works—not because we don't have intelligence indicators that tell us something is happening. It's because for a lot of reasons we don't react to those intelligence indicators in a way that in hindsight we wish we would have.

Mr. HUNTER. In other words, it's to the advantage of the enemy, whether it's Pearl Harbor, or Saddam Hussein moving into Kuwait, to not tell your adversaries what you're going to do?

Mr. PAYNE. Well, to the extent that they can hold back from telling us, that's right.

Mr. HUNTER. A question on that. Why do we presume this unnatural human trait that we will be warned by our adversaries in advance? We always presumed some sort of warning from the Soviet Union in the cold war strategic scenario, based not on a warning we're going to hit you now with nukes from the Soviet leadership, but based on the idea that you would have some type of a—because these were two superpowers that were poised at each other's throats with these vastly different political systems, and with these arenas of conflict around the world, in the cold war world, that we would see some external indicia of conflict before it occurred, that we would—that our differences were so great, and there was so much friction between the United States and the Soviet Union that something would bubble up, and we would see the bubbles, we would see the ripples in this world situation that was deteriorating quickly, and so we would have some warning.

But in this post-cold-war world, there was absolutely no reason for Saddam Hussein to tell us that he was going to move his tanks. You know, I asked our defense experts who gave us the national intelligence estimate how many of them predicted the movement on Kuwait, and one of them actually said, before or after the tanks started moving.

None of them predicted it. So, I guess what I'm asking you is why do we persist with this idea that our enemy is going to disclose to us his actions before he takes them? Why should we base national security on that presumption?

Mr. PAYNE. Well, my frank answer is because I think it's a pleasing assumption, and it makes life easier. As a historian, I can tell you that if you go back and look at the incidences of surprise attack over the last 50 years, what you find is that surprise attacks frequently work.

They do work as a surprise, even if the victim has some external signals, they tend not to react to them. Historically that's the case.

Mr. HUNTER. OK.

Mr. PAYNE. And so whether you assume a 14-day grace period, that you're going to get that much time, or a 30-day grace period, historically what we know is frequently that's just not the case. And so to assume that to be the case in the future is probably a misstep.

Mr. HUNTER. OK. Thank you.

Dr. Buchan, do you have anything you would like to say in regard to this issue?

Mr. BUCHAN. Actually I have a side comment which probably has nothing to do with anything—

Mr. HUNTER. Listen, you've got free license. This is a free-wheeling discussion. Go right ahead.

Mr. BUCHAN. This is about predicting invasions and stuff, and always being wrong on this. My wife was one of the people who predicted the invasion right. She was a Central Intelligence Agency [CIA] case officer at the time, looked at the photography and said they're going to invade.

Of course, nobody listens to CIA case officers at the time it applies. There's even an institutional reason for that. The odds are always much better of saying nothing is going to happen than something is going to happen and being wrong is unfortunate in that arena.

So, it's very unusual for anybody to correctly predict that an invasion is about to happen, and then inform policy makers and allow them to respond properly.

General HORNER. It is interesting that during the cold war we were postured for surprise attack. The Defense Support Program satellites, the missiles with their reaction times, the bombers on alert, submarines in their bastion areas and out in their patrol areas.

So when the national strategy was truly vital, we postured for surprise attack.

Mr. HUNTER. In other words, we couldn't afford to be wrong.

General HORNER. That's right.

Mr. PAYNE. Right.

Mr. HUNTER. Interesting. Dr. Payne, you had a series of changes you would make, besides the two that we have mentioned, in any new bomber study.

We have discussed the surprise attack change that you would make, also the value of deterrence in analyzing the value of bombers. I thought that was a—you had a good list there of criteria.

Would you go over those again, the remaining criteria?

Mr. PAYNE. Sure. One would be to look at other scenarios than those involving North Korea and Iraq, which were the base scenarios for the heavy bomber study. And, in fact, basically there's just one war examined, and two scenario variants of the same war.

There should be a whole spectrum of potential wars looked at, because one of the things we know about the post-cold-war period is that it's going to be fairly unpredictable.

There are lots of different foes that we could face, and to look exclusively at two moderate-sized states being the hostile parties we're dealing with sets aside a whole series of events that could happen that we'll have to respond to.

Sort of like judging an athlete for the decathlon by how quickly he can run the 400. We need to look at lots of different possibilities, and if we don't, you're not going to get a very useful answer.

That's one. The other is—and it fits with that particular point, and that is because there are lots of different questions out there, and lots of different potential contingencies, we should look at how bombers play in the full range of their capabilities.

If you go back to the heavy bomber force study, they tend to focus on one particular role—not exclusively—but they tend to focus on one role for the bomber, and that's hitting the front echelon of forces coming across the border. But bombers can do a lot

more than that, and they should do a lot more than that, and the Air Force has said for years that they do a lot more than that, and they do a lot more than that very well.

But if in your study you focus on that one exclusive mission, largely, then again you're judging the athlete by how well he runs the 400, even though he's going to be suitable for a decathlon, and that's not a very good way to judge.

Mr. HUNTER. So you think that the flexibility of bombers is not adequately valued in most of these studies.

Mr. PAYNE. Absolutely right.

Mr. HUNTER. And should be.

Mr. PAYNE. If you want to have a study that tells you something useful, it should be.

Mr. HUNTER. OK.

Mr. PAYNE. And then, as I said—

Mr. HUNTER. Well, that's a rare thing on Capitol Hill, but this time we might want one.

Mr. PAYNE. And then the last one was that we need to give greater weight to the potential constraints to U.S. force deployments. In other words, in these studies what you tend to have is a base case where the United States can bring lots of expeditionary forces to the area, they have time to do it, we have allied bases we can use, we have carrier air, we have all the assets that we would need, and in the gulf war in some cases that was the case.

That may not be the case next time around. And that's an important point. In fact, we just saw an example of it within the last few days. Where did the B-52's have to go to from CONUS to make their strikes against Iraq? They had to go to Guam.

Mr. HUNTER. Yes.

Mr. PAYNE. Why was that? At least according to the paper today, it was because we didn't get permission from Turkey and Jordan to overfly air space to conduct the strikes from there.

In the future scenarios, we may have exactly the same case. We don't have allies who are willing to give us permission to do those kinds of things. So that's what I mean. We need to give greater weight to what I think are very realistic constraints on U.S. force deployments in the future.

And if you don't do that, again you're going to have a scenario that doesn't produce very useful results.

Mr. HUNTER. OK. Dr. Buchan, you've made a pretty strong statement when you analyzed the heavy bomber force study. You said that once the assumptions of the study were stated, one could have concluded in somewhere between 30 seconds, and perhaps if one were very careful and thoughtful, 2 or 3 minutes, how this was going to come out.

Mr. BUCHAN. Right.

Mr. HUNTER. How cynical. I'm shocked. Shocked that you would come to that conclusion.

But have you made recommendations? Now, you've listened to Dr. Payne. I think he's made some commonsense recommendations. Do you agree with the basic change in presumptions that he has recommended?

Mr. BUCHAN. Yes, I do. The fundamental problem with the heavy bomber study, as we've all stated, is that whoever framed the study cooked the books.

They allowed a set of assumptions that led to a preordained outcome by essentially ruling out all the things that would have led them to any other result.

For example, as I pointed out last year, right after this study happened, how could they not have concluded that B-2's were not cost effective, since in the basic scenarios they allow all the services to move all of their forces into the theater, in essence, prepare fully.

At that point we probably had enough firepower there to defeat all of histories combined armies. So then when we threw in 20 more B-2's we did a little better, could barely see the blips on the curves, at much greater cost.

And, of course, we weren't considering scenarios that stressed B-2's, specifically the surprise attack scenario. In fact, it turned out that even their excursions in the surprise attack scenario assumed that the bombers still had, were allowed to have escorts.

If you allow B-1's to have escorts, since we already own B-1's and don't have to pay for them, then they're of course going to come out looking more cost effective even in that scenario.

We don't consider that realistic. We consider it reasonable to at least consider the case where in fact you don't have much warning, and you don't have escorts, and the only way you can fight is with B-2's.

And that's what led to the sort of results I've told you about.

Mr. PAYNE. May I add a comment to that, Mr. Chairman? The extent to which this is demonstrated in the heavy bomber force study is illustrated by the North Korean scenario.

The base case with the North Korean scenario, where again we have 14 days of warning, where anybody would tell you that if there's going to be a North Korean attack against the South, if you look at the way the North Koreans have developed their strategy, developed their forces, it's for a surprise attack.

The idea of having 14 days warning of a North Korean attack on the South goes against most of what we know about North Korea, and, in fact, it goes against our own public statements by Department of Defense and intelligence officials with regard to what a war run by North Korea would look like, which focuses on surprise.

And yet, in this case, the assumption was, by and large in the base case, was this warning.

Mr. HUNTER. Thank you gentlemen. You kind of remind me of the Border Patrol when they told me I like everything about this job except for contact with illegal aliens.

It seems to me that the idea of bombers is to provide, is to change balances of power in the theater, not to presume that everything is going fine, and would they help a little bit.

But, Mr. Lawler, let me ask you a couple of questions here with respect to your—let's get down to business here. Maybe I can eliminate some of those 300,000 government shoppers by doing some shopping myself.

What is the status of the company's June 1995, firm fixed-price proposal to build an additional 20 B-2's? Where are we at right now?

Mr. LAWLER. Well, that offer is obviously, the data and that information and that proposal is out of date. So, we can't do what we had proposed to do at that time on the schedule or the cost that we had.

We are, however, looking at what would it take to reconstitute from this day forward.

Mr. HUNTER. So you're taking a look at that now?

Mr. LAWLER. Yes; we're taking a look at that now.

Mr. HUNTER. If a decision were made to procure additional B-2's next year, do you have any idea how long it would take to deliver the first of these additional aircraft?

Mr. LAWLER. We've taken enough looks to know that if you get authorization in early 1998, in other words, authority to proceed in 1998, which is probably the earliest from this day forward that you could do that, we could deliver an airplane in 2004.

Mr. HUNTER. OK.

Mr. LAWLER. And that would assume that you had a 2 year long lead procurement, beginning in 1998, and authority to proceed, start reconstituting the industrial base, and get the appropriate amounts of funding in the 1998-99 years to do that.

Mr. HUNTER. What is the impact on the subcontractor/vendor base on the decision, as a result of the decision to convert the test aircraft to an operational bomber? Has that had a salutary effect on the base?

Mr. LAWLER. Well, it has. In some cases, we were able to revisit those vendors who were essentially out of work on the base program, and we have been able, as a matter of fact, to help the procurement of spares and help the cost of those spares by combining the buy for the 21st airplane with those.

So it has had a beneficial effect on our spares procurements. But it also has, in the instance of Hughes, it has kept Hughes, the radar construction available for probably another year.

In the case of Boeing, which is our largest subcontractor, it provided some engineering work for another 6 months or a year beyond what we would have had. So it has had a beneficial effect in keeping the critical subcontractors, major subcontractors together for another year, essentially.

And it will provide additional sustaining support, but I would say principally that it's been beneficial to us to the extent of about a year.

Mr. HUNTER. OK. Last July the Deputy Secretary of Defense informed the committee that the Department's heavy bomber industrial capability study concluded that the basic industrial capabilities required to design, develop, and produce bombers are present throughout the aircraft industry, and will not be lost if a decision is made to conclude the B-2 program at 20 production bombers.

The study further concluded that B-2 production could be restarted in the future should it be necessary to do so. Do you agree with these conclusions? And I know you've talked to them to some degree already.

Does this study accurately reflect the impact of terminating the B-2 program on the industry's ability to support a B-2 restart at the subcontractor and vendor levels? What is the immediate impact on the Palmdale area of ending B-2 production?

Mr. LAWLER. I don't agree with the basic conclusions. We had discussions at great length with the folks that were doing the study.

What this really does not take into account is the cost of re-establishing the industrial base. Now, the Department of Defense has done studies that showed, ranging up to \$45 billion of research, development, test, and evaluation [RDT&E] to start a new bomber program.

That's more than the total cost of the B-2 program. Things don't get cheaper in the future. They usually get more expensive, and I agree with that basic theorem.

You can build a new bomber, obviously. We build new airplanes. We restart programs. But what you do is you have to consider what that costs you. We can reconstitute the B-2 20 years from now, but you wouldn't want to see the bill.

Right now, as I spoke earlier, there's a window of opportunity, and if we don't do it by 1998, we will lose the capability to do the B-2 in an economical fashion.

The other thing that is ignored is that the industrial base of this Nation, with regard to building large, complex platforms like the B-2, the B-2 is not like a fighter plane. The B-2 is like the complexity of a space shuttle or a Saturn.

I worked on both of those programs, and I can tell you that it is the same complexity. We have almost 2 million lines of software code flying in the B-2. That's more than the space shuttle.

You don't just walk out on a street and pick up somebody who has never worked on a program of that magnitude. We had the benefit of the space shuttle. We had the benefit of the B-1B program, that we recruited people from, to work on the B-2.

If those go away, what program of that complexity is there to recruit those from 5 years from now? You won't have that. And that's an argument that was ignored.

Mr. HUNTER. OK. I appreciate the answer, Mr. Lawler. Finally, could you provide details on the recent thermal imaging event that occurred at the Farnborough Air Show.

Mr. LAWLER. I can't, because I wasn't at Farnborough. I read the newspaper article like everyone else. I can give you my personal response to that. If the ranges that were in question were as described in the newspaper, the human eye would have been a better sensor than the thermal imager. And it's very easy to see anything on final approach to an aircraft, to an airport.

But I have no concerns about the infrared [IR] signature of the B-2, and I don't think the Air Forces does either.

Mr. HUNTER. Lastly, gentlemen, and I appreciate you for staying so long with us. Obviously arming the bombers is important—all the bombers, and arming the B-2's is important. Getting precision-guided-munitions on these platforms is extremely important.

It seems like it's taking a long time, and yet the PGM's aren't space based lasers. They're not that complex, and you get a little steel, a little explosive, and a little guidance.



Do you recommend an acceleration, or at least exploring ways to accelerate this arming of the bombers, so we don't go several years down the road and find we still don't have much in terms of PGM capability?

It just seems like it's a part of the problem that should be less complex than the other parts, and yet it seems to be taking a lot of time.

Mr. LAWLER. I'd like to respond to that if I might. In the case of the GATS/GAM, we looked at the same thing, and we said the B-2 was not going to have a precision weapon until close to 2000, and that was unacceptable.

So the Air Force, in partnership with us, set up a program that was a quick reaction program, and we eliminated a lot of the bureaucratic constraints that are normal in the development of a weapons program.

From start to finish, from idea to delivered hardware to White-man Air Force Base was 30 months. And in total integration on the B-2 program, which was extraordinary. So if you can do it if you get the right attitude between customer and contractor and the right emphasis on it.

And I think the only thing we need is the emphasis on that, and I agree that it's necessary.

Mr. HUNTER. Thank you. And, lastly, General Horner, I don't know if you've seen Jim Courter and Lauren Thompson's article in the Wall Street Journal entitled "Why the Stealth Bomber Must Not Disappear." But have you taken a look at that?

General HORNER. I was shown that, but I didn't have a chance to read it.

Mr. HUNTER. OK. I recommend you take a look at that, because I think Jim is hosting the B-2 forum tomorrow, but I thought it was quite interesting, and was very well written.

Gentlemen, thank you. You've spent a lot of time with us, and we appreciate that. And we have pretty good attendance by our members, too, considering we finished voting hours ago, and it was flapping coattails as the boys headed for the doors to get back to their districts, especially at this time of year.

But this is a very critical part of America's security, and this program is very important to us. Bombers are very important to us, and the ability to project long-range airpower is very important.

I thought it was kind of interesting, looking at our graph over there, when you look at the comparisons of the number of aircraft that are needed to escort a couple of bomb droppers when you don't have Stealth capability.

But it's especially interesting when you keep reflecting that we've got little more than half of those accessory platforms around than we had when we first started putting those graphs together.

We've got—from my estimation—vastly diminished air power, and that would tend to compel us to go with the force multiplier, I would think.

But as you know, this is a program that has technical dimensions, and strategic dimensions, and political dimensions, and we're right in the middle of the political dimensions right now.

Thanks for your contribution to this discussion and this important debate. And I'd like to, if we could, if we have any other ques-

tions that staff comes up with to be able to submit those questions to you gentlemen, and receive answers back, written answers. Would you do that for us?

And Mr. Skelton has some information he'd like to reference.

The information referred to by Mr. Skelton is: First, "Long-Range Bombers and the role of Airpower in the New Century" [a publication of the Institute for Foreign Policy Analysis]; second, Washington Post article dated July 16, 1996. "A Bad Rap on High Tech," written by Eliot Cohen.

Mr. HUNTER. Steve, anything else you think we should cover? I want to thank Mr. Thompson for working those long hours. We took him off the golf course three or four times to work on this hearing. He was reluctant.

That's actually not the case. He's a great worker and really has done yeoman work on this job.

The hearing is concluded.

[Whereupon, at 4:38 p.m., the subcommittee adjourned.]



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